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AND

SCIENTIFIC AND LITERARY REVIEW,

A RECORD OF PROGRESS IN ARTS, INDUSTRY, AND MANUFACTURES,

INCORPORATING THE

Journal of the Inventors' Institute.

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VOL. XIV.—No. 10.] OCTOBER, 1879. [PRICE 6d.

[THIRD SERIES.]

⁂ *Communications to the Editor to be addressed to him at 21, Cockspur Street.*

CONTENTS.

PAGE
ADVERTISEMENTS 141
INDEX OF APPLICATIONS FOR PATENTS 141
THE EDDYSTONE LIGHTHOUSE 143
AURORA (Poetry) 143
REVIEWS—
  Vago's Phrenology Vindicated 144
  Baird's Record of Science 145
  History of the Locomotive Engine 145
  Scientific Terms 145
  French Pronunciation 145
THE IRON AND STEEL INSTITUTION AT LIVERPOOL 145
THE FRENCH PATENT LAWS 146

PAGE
RETRIBUTION (Poetry) 147
PROCEEDINGS OF THE INSTITUTE 148
MONTHLY NOTICES 148
VERBAL AND PRACTICAL EDUCATION 149
THE BRITISH ASSOCIATION—
  Mathematical and Physical Section 150
  Biological Section—Department of Anthropology 150
  Mechanical Section 150
  Geological Section 150
  Physical and Mathematical Section 150
  Geological Section 150
  Biological Section 151

PAGE
Chemical Science Section 151
PROTECTION OF SHIPS FROM LOSS BY FIRE AND FROM LOSS BY SINKING 152
MILITARY TRAMWAYS 152
DISINFECTANTS AND HOW TO USE THEM 153
THE CONSCIOUSNESS OF PAIN IN INFERIOR ANIMALS 153
SPIRITUALISM AND MR. J. W. FLETCHER 154
TECHNICAL EDUCATION 154
CORRESPONDENCE—
  Improvement of Sound 155
RECENT AMERICAN AND FOREIGN PATENTS 155
ADVERTISEMENTS 156

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Railways, Carriages, Coupling, Uncoupling, and Altering Position of Carriages and Engines.—R. H. Hepburn, 3396. W. B Berry, 3444. J. W. Grover, 3556. F. Service, 3589. T. R. Jordan (com.), 3597. W. Fell, 3616. J. Livesey and H. B Greenwood, 3701. T. A. B. Putnam, 3728. J. Brown and J. Esplen, 3740. W. Lockwood and H. H. Andrew, 3792.

Reaping, Mowing, Making Hay, Gathering in Produce.—W. Clark, 3292. D. G. Williamson, 3435. W. P. Thompson (com.), 3441. J. W. Sutton, 3759.

Refrigerating, Cooling Liquids, Making Ice.—J. Henderson and R. Law, 3418. G. Kent, 3570. C. D. Abel (com.), 3588. J. W. Sutton, 3758. T. M'Nulty (com.), 3773.

Registering, &c.—J. W. B. McAdam, 3495. W. Miller, 3618. H. Lunn, 3662. G. Salter, 3676. J. Britten, 3787.

Retorts, Gas Holders, &c.—A. L. Doucet, 3586. C. Madge, 3695.

Roads, Streets, Pavements, &c.—C W. Bradshaw, 3413. C. Kesseler (com.), 3498. E. M. Warquier, 3524.

Ropes, Cords, &c.—A. Ford, 3380. W. M. Bullivant, 3390.

Sewing and Embroidering.—C. Pieper (com.), 3408. A. M. Clark (com.), 3494. T. White, 3533 G. W. von Nawrocki (com.). 3652. T. R. Rossiter, 3720. J. Blain, 3746

Ship and Boatbuilding.—J. Casey, 3450. L. A. Groth (com.), 3603. H. W. Lees (com.), 3635. W. Ward, 3650. G. G. F. Edwards, 3690. J. Whitely, 3743. J. T. Rowe, 3761. T. Silver, 3795.

Ships' Cargoes (Loading and Unloading.—F. Service, 3589.

Ships' Logs, &c.—A. M. Clark (com.), 3629.

Shirts, Collars, &c.—A Wright, 3789.

Shot, Shell, Bullets, Cartridges, Percussion Caps, &c.—H. A. Bonneville (com.), 3468.

Shuttles, Bobbins, Spools, &c.—B Stansfield and J. Grindrod, 3412

Sifting, Sorting, and Separating.—L. Fiechter (com.), 3663. C. F. Hargreaves, 3718.

Signals, Alarms, Communicating Apparatus, Conveying Sounds.—G. Pitt (com.), 3425. W. Robinson, 3479. G. Brockelbank, 3482. W. L. Wise (com.), 3527. C. L. Field, 3542. W. T. Whiteman (com.), 3577. J. G. Tongue (com.), 3599. M. Hahn, 3647. T. A. B. Putnam, 3728.

Siphons.—A. T. Angell, 3784.

Smoke (Preventing, Burning, and Condensing).—A. Backhouse, 3609. N. Macbeth and T. Beeley, 3687.

Soap, Soda, Washing Powders, &c.—J. B. Lee, 3737.

Soundings.—T. F. Walker, 3487.

Spindles.—A. Kershaw, 3400.

Spinning and Preparing for Spinning.—W. R. Lake (com.), 3376. A. Kershaw, 3400. E. Hird, 3409. H. C. Bill, 3446. P. O. Halloran (com.), 3447. W. R. Lake (com.), 3451. W. B. Gray, 3453. R. Curtis and T. Barker, 3468. C. D. Abel, (com.), 3511. R. J. Hartley and E. Slater, 3539. A. M. Clark (com.), 3568. E. Denby, J. Helliwell, W. Hillery, and W. Riley, 3605. G. Davies (com.), 3607. R. W. Raphael, 3643. J. Holding, 3666. J. W. Thornton, 3713. T. Brooks, 3739.

Spoons and Ladles.—T. P. Lomas, 3574.

Springs.—H. N. Wilson and J. Clegg, 3641. J. Offord, 3642. G. F. and F. R. Abel, 3665. J. and S. J. Coxeter, 5760. W. Lockwood and H. H. Andrew, 3792.

Starch.—A. Manbre, 3481. A. M'Diarmid, 3492.

Stays, Corsets, &c.—W. L. Wise (com.), 3456. A. M. Cave, 3617.

Steam and other Boilers, Cleaning and Preventing Incrustation of Boilers, Water Feeding Apparatus for Boilers.—E. P. Alexander (com.), 3386. A A. Kickaby, 3573. J. Whitley, 3742. G. C. Hopper (com.), 3766.

Steam Engines (Stationary, Locomotive, and Marine).—N. P. Parson, 3381. J. W Wilson, 3406. H. L. Miller (com.), 3434. J. N. Churchill, 3457. C. Kesseler (com.), 3486. M. E. Walton, 3512. A. A. W. von Reede, 3514. J. Sharp, 3558 J. Type, 362[illegible]. W. Turnbull, 3625. J. N. Holiday, 3631. J. Tangye, 3674. E. Wimshurst, 3705.

Telegraphs; Telegraph Printing Apparatus.—T. Young, 3368. P. S. Justice (com.), 3393. A. Wilkinson, 3472. R. H. Boule, 3525. W. T. Whiteman (com.), 3577. W. C. Barney, 3646. G. F. Redfern (com.), 3679. W. R. Lake (com.), 3778. A. White (com.), 3794.

Thermometers, Barometers, Pyrometers, &c.—H. Airy, 3680. W. D. Bowkett, 3712.

Thrashing Machines, Reaping Machines.—W. Wells, 3764.

Threads, &c.—E. Cockerill, 3606. J. Blain, 3746.

Tilling and Cultivating, &c.—E. G. Russell and E. Fishwick, 3554.

Tobacco and Snuff, Cigars, Cigar-holders, Pipe and Cigar-lighters, Smoking-pipes, Tobacco, pouches.—J. R. Bird and C. G. Robertson, 3395. W Abbott and A. Dymock, 3517. J. West and J. Reid, 3584. D. J. Baker, 3610. H. H. Lake (com.), 3677. C. Cheswright, 3696. C. Kesseler (com.), 3710.

Tramways and Tramway Carriages, Tramway Locomotives.—J. W. Grover, 3556. J. Livesey and H. B. Greenwood, 3701.

Traps for Animals.—R. Cameron, 3378.

Traps for Drains.—F. Blakey and H. Wilson, 3460. G. F. Farrow, 3546. P. S. Justin (com.), 3639. R. W. Armstrong, 3644.

Umbrellas, Parasols, &c.—G. H. Spencer, 3540. W. R. Lake (com.), 3778.

Upholstery.—A. Ford, 3380. H H. Lake (com.), 3651. G. and W. Timmins and G. T. Lea, 3736.

Valves, Taps, Stop Cocks, Plugs; Regulating the Flow and Pressure of Fluids.—C. E. Peel, 3384. J. Casey, 3450. J. W Churchill, 3457. J. Rice, 3477. C. Wetter (com.), 3500. A. Faulder, 3507. A. A. W. von Reede, 3514. W. Turnbull, 3625. J. N. Holliday, 3631. J. Tangye, 3674. H. and W. Braithwaite, 3664. H. Simon (com.), 3723. J. Dodd, 3782. R. Cole, 2796.

Velocipedes, Bicycles.—T. J. Ashton, 3523. T. Forshaw, 3550. N. K. Husberg, 3564. C. F. Foster, 3569. W. K. Graham, 3614. W. W. and J. W. Brereton, 3756. W. Howes and W. Burley, 3767.

Ventilation; Supplying and Purifying Air for Buildings, Mines, Ships, Carriages, &c.—A. Backhouse, 3609. J. A. R. Hildebrant (com.), 3632. W. R. Lake (com.), 3744.

Washing, Cleansing, and Wringing Fabrics, Yarns, and Materials.—J. Smith, 3440. A. A. Rickaby, 3573. J. Ireland, 3606. J. Ballantine, 3637. H. N. Wilson and J. Clegg, 3641.

Waterclosets, Urinals, &c.—V. E. Etrienne, 3590. G. Manwaring, 3646. H. and W. Braithwaite, 3664. J. Dodd, 3782.

Weaving, Braiding, Plaiting, Preparing for Weaving.—B. Stansfield and J. Grindrod, 3412. O. Pickles, 3416. G. Burslem, 3417. J. Hollingworth, 3452. H. Livesey (com.), 34[illegible]6. J. Brownhill, 3526. A. Hall and J. Schofield, 3537. R. Hall and W. Nuttall, 3538. G. Harling, 3583. J. Farran, 3688. J. Lewis and W. M. Langley, 3726. J. S. Crowley, 3748. O. Pickles, 3783.

Wheels for Carriages, &c.—J. Bickford, 3439. T. E. Rigby (com.) 3763.

Winding Threads, &c.—J. Holding, 3666.

Window Blinds, &c.—J. J. Sachs, 3643. J. Livesey and H. B. Greenwood, 3701. G. and W. Timmins and G. T. Lea, 3736.

Windows and Sashes.—T. L. Leech and E. Holland, 3403. C. Kerby, 3442. E. Russ, 3483. M. Andrew, 3518. W. Gibson, 3557. H. Brittain, 3630. J. Livesey and H. B. Greenwood, 3701. W. P. Thompson (com.), 3785.

Yeast.—T. J. Handford (com.), 3706.

⁂ *The above List is prepared from the Patent Records by Mr. T. Morgan, Secretary of the Inventors' Patentright Association, Limited.*

THE EDDYSTONE LIGHTHOUSE.

Mr. William Gill, 1, Millbay-road, Plymouth, agent for the Torquay Terra Cotta Company, has just designed a special work of art, having for its subject Smeaton's great work. Being struck with the idea that a painting of the lighthouse might be placed to advantage on a terra cotta plaque, he ordered a number to be executed. These have now been finished, and the painting has been admirably and accurately performed by Mr. A. Fisher, who was guided in his operations by a photograph of the stone. The lighthouse is shown on separate plaques as it appears by night, and also by day; and the reef of rocks is well brought out, the one on which the new structure is to be erected being specially prominent. We understand that their Royal Highnesses the Prince of Wales and the Duke of Edinburgh were so pleased with the two first completed that they at once ordered them as mementos of the ceremony in which they took so prominent a part. It may be stated that these plaques are Mr. Gill's speciality, and can only be procured through him.—*Court Journal.*

AURORA.

The bright dawn gilds the mountain's brow
And sleeps the moon's pale sheen;
Aurora sheds her radiance now,
While peep the stars between.
From slope to slope the waters play,
Or dance with childlike glee:
And murmur music on the way
In ripples to the sea.

The white mist leaves the grassy glade,
Where beds of violets lie;
The deer steal from the woodland shade,
The lark sings to the sky:
A song, to woo me from my sleep,
A long melodious lay!
E'er, angel-guards their vigils keep,
From dreams of night, to day.

Henry George Hellon.

Reviews.

VAGO'S PHRENOLOGY VINDICATED.

"Phrenology Vindicated," being a reply to the article by Dr. Andrew Wilson, entitled "The Old Phrenology and the New," which appeared in "The Gentleman's Magazine," January, 1879, by A. L. Vago. London: Simpkin, Marshall and Co

WHETHER Phrenology is, or is not, to be ranked amongst the sciences is a moot question, and we are not going to give a positive answer to it. However, its principles have now been so well elucidated that it is worthy to receive the careful attention of the scientific man (hence we think it right to bring the work before us under the notice of our readers). Mr. Vago, who is a veteran phrenologist, has, it appears, been stirred within him by some views on the subject of phrenology propounded by Dr. Andrew Wilson, in the *Gentleman's Magazine* for January in the present year. We cannot of course reproduce the whole of Mr. Vago's work, although it is but a small one; therefore we must leave those who wish to learn the exact detail of Dr. Wilson's arguments to consult the magazine referred to, and shall content ourselves with the following quotation, which will, we consider, be found to supply a vindication of phrenology which demands every attention:—

Phrenology, by embracing both departments of study, mind, and brain, has successfully solved two problems, which singly had baffled all previous attempts to explain satisfactorily. The undertaking naturally presents itself as onerous if not absolutely impossible. Hence it finds no favour in the scientific class-room, where it is either pooh-poohed, or the attention is too much engrossed with monkeys and fossils to consider its claims.

To accept Phrenology upon faith is an easy matter, but to understand it is to engage in a study of the most abstruse kind, presenting, as it does, principles which, at first sight seem self-conflicting and repugnant to previously cherished views.

Thus beset, the vacillating novice may turn from the task, as being likely to lead to nothing but a jumble of contradictions, unless he is induced to engage in it with the view of exposing its apparent fallacies; but it is then that he is taken in his own snare, and himself becomes converted. Many who have started upon the study of Phrenology in this spirit have ultimately become its ablest propounders and most zealous advocates. Mr. Abernethy was an instance, if we may judge from the following extracts. When lecturing on the phrenological doctrines to the Court of Assistants of the College of Surgeons of London, in 1821, after discussing the nature of the faculties to the exercise of whose functions the different organs of the brain subserve, and the situations of these organs, Mr. Abernethy says:

"In looking over the list of faculties, in order to see if I could reconcile them to analogy and reason, I could discern no order nor connection between them. The whole presented to me a rude appearance quite different, as I then thought, from what is found in Nature. But after a more attentive consideration, light began to dawn upon me; and, beginning to consider the faculties in a certain way and to group them after a certain order, the whole gradually formed themselves before me into a system of surprising symmetry; and—like the disjointed parts of an anamorphosis, when seen from the proper point of view, collecting themselves under one elegant design—delighted me with the appearance of that very order and beauty that I would beforehand have expected to find in the mental faculties. The harmonious junction of the organs, the beautiful adaptation of the faculties to each other, and to the phenomena of mind, as observable in every state in which it exists, are far too remarkable, and the coincidences far too numerous and exact, to have occurred by chance.

"As soon would a number of letters shaken out of Swift's laputian machine fall of themselves into a scientific treatise, as would the names of thirty-five or six faculties, put down at random, compose a complete and well-combined scheme of the human mind, such as this appears actually to be. The inference is, I think, irresistible, either that the scheme, which appears so well arranged, has been invented by Drs. Gall and Spurzheim, or (if they actually proceeded, as they tell us, and found it piecemeal by a gradual and patient examination of facts) that the harmony and systematic junction of these scattered members forms a very strong presumption—to say no more—in favour of the accuracy of their separate observations, and of the system being truly founded in Nature.

"Had Drs. Gall and Spurzheim sat down with the purpose of constructing a system from their own imagination, it is next to morally impossible that they could have contrived one which harmonises so completely with itself, and with the actual state of the mental faculties, and the uses to which these faculties are subservient. This is a problem which has puzzled the most eminent philosophers of ancient and modern times; and all attempts to solve it have hitherto been fruitless, so as almost to conclude that its solution was beyond the reach of human ingenuity.

"If, then, these gentlemen have actually succeeded in inventing a system like this, which affords a key to the mental constitution of man, and a facility of accounting for the diversities of human character and intellect, far surpassing any other system that has ever yet appeared—supposing it to be, as all other systems have been, purely hypothetical—it would entitle its authors to rank as philosophers with the highest names that ever have adorned the annals of the world."

Thus guided by so competent an authority, every medical man set up a phrenological bust in his surgery, in recognition of the respect which he entertained for the phrenological doctrines. This became so general that a surgery was considered to be but incompletely furnished without such a bust; and a phrenological head was a regular item in the order for an outfit such as supplied to medical men by the firm of Messrs. Maw, Son, and Thompson, surgical instrument makers, of London. The example thus set by the surgeons was followed by the chemists, who, from the erudite appearance which it gave, placed a phrenological head in their windows. Thus exposed, these busts often found a sale among the general public. To keep up appearances with their betters, the quack doctors exhibited them in recommendation of their profession. This so disgusted the chemists that many of them discontinued to show them.

The phrenological heads were adopted by the opticians originally to show spectacles on, who, finding a sale for them, have continued to keep them ever since; and from a brief glance at one of these heads Dr. Wilson was induced to jump at such latitudinous conclusions about their presumptuousness.

As to the experiments made upon the living brain with electricity, which have been resumed for some years now, nothing through them has been elicited to lead to anything definite concerning the functions of the brain. Even the discovery of the speech centre is not due to such experiments, but to pathology; nor does there seem to be any prospect of their being of the least avail in this respect.

The manner in which such experiments are conducted renders success in this quarter altogether impossible. A monkey, or some other dumb animal, is by the application of chloroform reduced to a state of apparent insensibility, and thereby rendered incapable of manifesting any kind of emotion of a mental nature. After a part of the skull being cut away, electricity is applied to a particular part of the brain thus exposed, and a particular limb of the animal is seen to contract or move; a certain other part of the brain is irritated and another limb is seen to be similarly affected; the phenomena being of a purely physical character without a single vestige of thought or feeling; just as seen in the puppet, where "you pull the string and the figure moves." By proving beyond doubt that particular parts of the brain subserve to distinct and particular functions, one, at least, of the phrenological propositions becomes in part substantiated; beyond this, with one exception to be named presently, these experiments are but tantamount to killing the goose for the golden eggs. This was observed many years ago by Mr. Lawrence, who says, "Living bodies, as well as all dead ones, exhibit electrical phenomena under certain circumstances; but the contrast between the animal functions and electric operations is so obvious and forcible, that the attempts to assimilate them do not demand further notice."

So much then for the new Phrenology, as anticipated to be the outcome of the experiments conducted by Professor Ferrier, which Dr. Wilson has so much extolled, and which was to blast Phrenology, the only physiology of the brain. As Mr. Lawrence remarks, "If the mental processes be not the function of the brain, what is its office? In animals, which possess only a small part of the human cerebral structure, sensation exists, and in many cases more acute than in man. What employment shall we find for all that man possesses over and above this portion—for the large and prodigiously developed human hemispheres? Are we to believe that these serve only to round off the figure of the organ, or to fill the cranium?"

Guarded by the stern rules of inductive reasoning, Phrenology stands fixed and pre-eminent among the sciences; while the ignoble sophistry raised against it falls unavailable as a shadow cast by the feeble glimmer of a three-farthing rush-light against the rocks of Gibraltar, in the attempt thereby to overturn them.

That most of the sciences owe their perfection to the aid they receive one from the other as also to the arts, is a well-known fact. The astronomer has been greatly assisted by the optician, whose art has proved useful in navigation and many other departments. The physiologist has derived much information concerning the elementary nature of the fluids secreted by the different organs of the body, from the researches of the chemist, and by which the physician is enabled to judge what drugs are suitable for particular affections. Indeed, in this way the physiologist has been guided concerning the functions of the internal organs from their becoming excited to functional activity by the employment of such agents as affect them. But while physiologists have taken advantage of thus tracing function to organ, they have hitherto overlooked what may be the function of the grey matter of the brain by a similar mode of investigation.

Electricity being the only agent by which the brain and nervous system is incited to anything resembling functional activity, the inference seems just that the brain is an electrical apparatus.

The white matter has already been ascertained to be but as the conducting wires or messengers; the grey matter overlying that being all that is left of the brain; it is in this alone that we must suspect the function thus pointed to it by electricity.

The telegraphic wires would environ the wide world over and over in vain but for the cells or batteries which generate their vitality. A part corresponding to such cells or batteries is necessary to complete the telegraphic system of the animal body.

Besides serving as the coping-stone in the brain's architecture, the grey matter of the brain is to the nervous system what the heart is to the arterial system. It fulfils the duties of both chemist and purveyor to the nervous system in general. Being itself nourished by the arteries which ramify its surface, the grey matter generates an electrical fluid, giving vital force to the whole nervous system. The cerebellum serving as reservoir and safety valve to the cerebrum, regulates the distribution of this fluid.

An insufficient supply of blood to the brain results in nervous depression, or want of mental energy and languor of body; while the opposite condition, restlessness and excitability even to a dangerous degree, arises from an excess of electricity in the nervous system due to a superfluity of blood to the brain.

The skull, by its divisions or sutures, is so arranged as to resist external pressure, but to yield and admit of expansion from internal pressure sufficiently to allow for the tidal flow of the blood without interrupting the brain's action.

A sudden eruption of blood to the head, by pressing upon the brain, checks the action of the grey matter, and induces prostration of body, accompanied by what is called a state of stupefaction, or a suspension of the mental powers. A patient in this condition is generally treated in a manner which tends less to accelerate recovery than to retard, if not to check it altogether. When what is now explained as the function of the brain becomes recognised, the following treatment will suggest itself in such cases:—

The patient, as hitherto, should not be left to lay horizontally, as this position allows of continued effusion of blood to, and therefore pressure upon, the brain, which but augments the malady. Any means by which a nearly perpendicular position can be maintained, as by a mould padded so as not to check circulation at any part of the body, is best. Ice, or anything cold, should not be applied to the top of the head, as this would congeal the blood and irremovably fix the cause of the affection. Cold wet cloths should be applied to the back, or nape, of the neck near the cerebellum, so as to check an upward flow of the blood in its circulation. Animation is continued by functional activity in the corporeal organs which, by continuity of action, will ultimately absorb the surplus blood of the body, and thereby relieve the brain, and so render recovery possible. A little blood-letting might be even beneficial.

A more expeditious treatment, which suggests itself in such cases, is to open the skull at one of the highest sutures, and remove the extraneous matter staying the brain's action.

Where recovery of the patient is dependent on such an operation being performed, the operator will not regard it as more dangerous than that of turning an eye by the oculist, or than amputating a limb by the surgeon; and where death is inevitable but by such means, there will be nothing to risk, while the probability of success makes the trial worth venturing.

It is well known to the medical faculty that large portions of the brain may be cut away without causing the least pain to the patient, though he be perfectly conscious when this is being done.

But this subject must be treated in a subsequent issue, as to consider all its bearings here would be a digression in this reply to Dr. Andrew Wilson's attack on Phrenology.

While the brain is thus taken up—the white matter in conducting our movements, and the grey in giving vitality to the white—in our simplicity we might be inclined to suppose that if the brain be thus entirely utilised, with nothing of it left to represent the mind, Phrenology must forego its claim of the mind's connection with the brain. But this idea will fall through as we learn to distinguish between organ and function. It betokens a narrowness of judgment to seek the mind in the instrument through which it manifests itself.

Mind is related to the brain in the same manner as is the grandeur to the architecture of St. Paul's Cathedral, which is not the material, but a result of the disposition of the material. To appreciate the beauty of St. Paul's Cathedral it is necessary to view it at a distance, but if the observer be too short-sighted thus to survey its beauty, he will certainly fail to see it by an examination of its particles even if he were aided by the combined power of all the microscopes in the world.

It is in its *uses* that the brain claims connection with the mind, and not in itself. As well might we look for intelligence *in the ink* upon this paper. The arrangement of the ink may both display and convey intelligence, but the ink itself is not intelligence.

The brain is, as it were, the mind's inkpot, which may contain what will serve to display every letter of the mind's volume; but it is not, therefore, the mind.

Be it ethereal or otherwise, the mind, as it manifests itself to our senses, is a phase or attribute of the brain's order. What the mind is, apart from the brain, is beyond the province of the phrenologist to tell."

In parting with Mr. Vago we must observe that we found in the earlier part of his treatise, and it caused considerable regret, disparaging observations on Physiognomy which, to our mind, are not capable of substantiation.

BAIRD'S RECORD OF SCIENCE.

"Annual Record of Science and Industry for 1878." By SPENCER F. BAIRD. New York: Harper Brothers; London: Trub- and Co.

MR. SPENCER F. BAIRD, the Secretary of the Smithsonian Institution, in 1871, first commenced this work in its present form Previously to 1877 the abstracts of papers were prepared by several specialists, but names of authors were not disclosed. The details were then enlarged, and each summary was prepared by some eminent man of science, and his name given. For 1878 this system has been continued. Those who desire to possess a faithful record of the progress of scientific discovery cannot have a more trustworthy one than this annual volume.

HISTORY OF THE LOCOMOTIVE ENGINE.

"A Rudimentary Treatise on the Locomotive Engine, comprising an Historical Sketch and Description of the Locomotive Engine." By G. D. DEMPSEY, C.E. With large additions, treating of the Modern Locomotive, by D. K. CLARK, C.E. Crosby Lockwood and Co.

THE first part of this elementary treatise is an abridgment of Mr. Dempsey's original description of the locomotive. The second part describes the modern locomotive, exhibiting the leading types, as far as English practice goes, from the newest form of express passenger locomotive to the steep gradient tank locomotive of Mr. James Cross, and the double bogie tank locomotives of Mr. Robert F. Fairlie. A special description of the details of a modern locomotive, and a section on the resistance of trains render this little volume a ready and efficient manual.

SCIENTIFIC TERMS.

"A Manual of Scientific Terms." By Rev. JAMES STORMONTH. Edinburgh: Maclachlan and Stewart.

MR. STORMONTH has prepared a glossary which gives careful derivations useful to students and amateurs.

Messrs. Griffith and Farran will shortly publish "L'Abecédaire" of French pronunciation, a manual for teachers and students, by Leprevost, of Paris. Its object is to teach French pronounciation systematically by simple and easy stages, each lesson being divided into two parts. The first part treats of the pronunciation of the vowels, consonants, diphthongs, nasal and liquid sounds. These are exemplified by lists of from 15 to 20 words each, with the English meaning containing no other sounds than those previously explained. The second part, called "French as it is Read and Spoken," treats of the connection of words of the elision of the E mute (including as many as nine E's in succession) a very important subject, without a complete knowledge of which it is impossible to speak French correctly, of the divisions of words into syllables, and of accent and emphasis.

THE IRON AND STEEL INSTITUTE AT LIVERPOOL.

THE autumn meeting of the Iron and Steel Institute, which was opened on September 24, in Liverpool, is one that is likely at the present conjuncture of affairs in the iron trade to attract a good deal of attention. Two circumstances must in the nature of things lead to this result. The first is that the iron and steel trades are now and have for some years past been suffering from quite a phenomenal depression. The other is that the great industry represented by the Iron and Steel Institute has recently been passing through a period of transition, both in its commercial and its scientific aspects, which is so far from being at an end that every day causes it to be more accentuated than another, while the future entirely fails to disclose the limits of the change. It is, of course, the function of the Institute to deal only with the scientific development of the iron trade. Commercial questions are strictly excluded from its consideration. But, as the *Times*, from whom we quote, truly says, applied science, unlike pure science, has always a more or less commercial aspect. No new process is ever introduced, no mechanical improvement is ever devised, without reacting directly upon the all-important determinant of cost of production, and it may be said of the questions that have recently engaged and are still engaging the attention of the Iron and Steel Institute that they affect the ultimate destinies of commerce and industry in a far higher degree than the elements that usually disturb, for good or for evil, the commercial barometer. Hence it is that public interest follows the proceedings of this professedly purely scientific body as closely and as eagerly as if it wielded despotic control over the interests that are mainly associated with the Stock Exchange. Nor has the Iron and Steel Institute failed altogether to justify this position. It has done much—more, probably, than any other influence—to promote the economical manufacture of iron and steel. Beginning with its first meetings at Middlesbrough and Wales, when its former president, Mr. I. Lowthian Bell, practically established a series of new, and, till then, uncodified laws with respect to the operation of the blast furnace, it has dealt from time to time with every intermediate and collateral phase of the trade, until it now determines, by a recondite and highly technical discussion of chemical laws and reactions, the commercial prospects and mechanical properties of steel. Of late it has given its attention almost entirely to the remarkable development of this metal. The uses and applications of steel have been as fully discussed as its manufacture and the resources available for its development. The latter aspect of the steel age has quite recently claimed a more than ordinary amount of attention, because of the promised elimination of the only element that has heretofore been an effectual bar to the utilisation of the cheapest and poorest ores of iron. At the meeting of the Institute held in London in May of the present year, a long discussion, in which the leading metallurgists of Europe took part, followed the enunciation by two young, and previously all but unknown, chemists of a process whereby the bane of the steel manufacturer might be got rid of and probably converted into his ally. There seemed then to be but little doubt in the minds of the most experienced men that a really practical success had been attained. But there have been various difficulties—all, however, of a minor character—to contend with in the actual working of the process, and hence the progress made with its application up to the present time has been much more limited than was hoped for. Naturally enough, the question that so greatly engrossed the attention of all iron and steel manufacturers in May will, while still in the region of experiment, command the lion's share of interest in September, and the papers to be read will afford an opportunity of saying all that has heretofore been left unsaid on this highly important matter. Two papers are to deal with the chemical aspect of the steel manufacture—the first by M. Pourcel, of Terre-Noire, one of the most capable chemists in France; and the other by Mr. Richard Brown, of Ayr, who proposes to neutralise phosphorus by the use of another chemical reagent in the converting vessel. Both systems, we may add, have been applied in a variety of ways, but the view generally entertained by men of experience is that there is no effectual antidote to the great bane of the iron and steel manufacturer short of its entire expulsion. It is not likely, therefore, that the so-called neutralisation of phosphorus by the use of some kind of "physic" will in any satisfactory degree meet the requirements of the case. The other papers to be read at the Liverpool meeting of the Iron and Steel Institute promise sufficient variety to suit all tastes and requirements. The progress of iron and steel as constructive materials will be considered in connection with a paper to be read by Mr. J. A. Picton—a gentleman whom the people of Liverpool have recently complimented by giving his name to the finest reading room in the provinces. The manufacture of forgings for shipbuilding purposes is to be dealt with by Mr. Ratliffe; and Mr. C. Wood, of Middlesbrough, is to advocate the claims of iron and glass to supersede timber in the construction of railway sleepers, &c. There are other subjects set down for discussion that come more within the domain of pure science, but upon these we need not dwell.

Every possible arrangement has been made to afford the members of the Institute opportunities of seeing the industrial sights of Liverpool and its vicinity and of carrying away a favourable impression of the place and its people. A very influential local committee has been formed, with the Mayor as chairman, to promote the success of the meeting. That committee has arranged a very interesting series of visits and excursions, embracing the Gallia, the City of Berlin, and the Germanic, the three first vessels of the Cunard, Inman, and White Star Lines respectively. Provision has been made also for an inspection of the more important of the extensive system of docks for which Liverpool is so justly celebrated and of which she is so justly proud. Among the works selected for inspection, the more attractive to the members of the Institute will probably be those of the Mersey Steel and Iron Company—the largest works of their kind in the country—and those of Messrs. Laird Bros., at Birkenhead, where several steamers are now being built of steel, and where a new turret is being fitted up on Her Majesty's ship Hotspur. Outside Liverpool excursions have been organised to Messrs. Blundell's fine collieries at Wigan, to the large works of the Wigan Coal and Iron Company, to wire works at Warrington, and to the extensive printing and stationery works of the Liverpool Railway Printing Company. The full and admirably arranged programme will conclude with a visit to the gigantic locomotive works of the London and North-Western Railway Company at Crewe, where the members are not only to be conveyed free of expense, but entertained to luncheon on their arrival. A large number of members have already reached Liverpool, and the meeting is expected to be as successful in respect of attendance as it promises to be in regard to the business transacted.

Although only a young association, the Iron and Steel Institute has already a membership and an influence rivalling the older institutions representing applied science. There are already over a thousand on its lists, embracing metallurgical chemists and engineers, as well as manufacturers in all parts of the world. Over 60 new members are proposed for election at the present meeting, so that the vitality of the Institute has evidently not been impaired by the long-continued dulness of the iron trade. The affairs of the Institute are controlled by a council of 30, which includes five members of Parliament, and a large proportion of that number have signified their intention of being present.

On 25th September Mr. J. A. Picton, Liverpool, read a paper on "The Progress of Iron and Steel as Constructive Materials." The paper, he said, was not a scientific one, but was rather an attempt to show what science, as applied to iron, had done in the past, what it was doing at present, and what it was likely and capable of doing in the future. He traced the history of iron from the time it began to be used until now, and said that with the free use of the metal commenced the dawn of the arts of life, whilst in regard to the future there could be no doubt iron was becoming a more important factor in the world's affairs. The ages of gold and silver might serve for the theme of the poet's fancy or the dream of the enthusiast, but the age of knowledge and progress, and power and wisdom, was the age of iron.

Though the paper was unscientific, the discussion which it gave rise to was thoroughly scientific, and dealt largely with the question of the use of steel for shipbuilding purposes.

Mr. D. Adamson, Manchester, strongly recommended the use of steel for the construction of ships. No doubt a great deal stood in the way of its use for that purpose, in consequence of the very high tests demanded by Lloyd's Registry, the Admiralty, and other powerful bodies. He thought their friends who had control of these matters had better abandon the extreme bending test, and have a more rational one, so that they could get a stronger material for the building of ships.

Mr. West, of the Underwriters' Registry for Iron Vessels, said he believed they were possibly making a mistake in being too severe in their bending tests, but he would be glad to see an increased tension with a material that could be relied upon in point of ductility, together with the requisite degree of hardness. The fault of the present steel was that it was a trifle too soft. They might have a higher tensional resistance, with reasonable ductibility and pliability for ship purposes.

Dr. Siemens rose, as one representing the steel makers more than the steel users, and he would say, "Don't diminish your tests, but rather increase their severity." (Hear, hear.) The President had asked why should they be so particular with regard to steel? Iron and steel differed in one important particular—iron always held together to a considerable extent, though it might be of a poor quality; whereas steel, if it was of a high quality, was almost indestructible; it would bend like leather, it would extend and not break. But if they left the high pedestal of perfection they got a very treacherous material.

The President, in closing the discussion, said the whole question as between steel and iron plates was one of the possibility of providing steel plates to supersede the present plates of iron for the hulls of ships, and that could only be brought about by bringing down the cost of steel plates to something very much nearer the present market price of iron plates. Notwithstanding the high opinion of Dr. Siemens, he (the President) was sorry to have to stand to the opinion he had already expressed—that the tests demanded for steel for ships were altogether disproportionate to the need, and that until they were abated very considerably, not so as to bring down the material to the level, or anything like the level of iron which was in general use, and was used without demur, but until they were brought down very considerably in the direction of what he would call practicalness, steel would never supplant in any large degree iron in the buildings of the hulls of ships. They must either do that, or raise the tests in regard to iron, and insist upon iron plates being of the same high quality as their boiler plates, in which case the market price of ships' plates would soon go up, and steel and iron would come into the market on pretty much like equal terms.

Mr. Thomas Wrightson, of Stockton-on-Tees, read a paper on the changes in iron and steel at high temperature, and the time for adjournment having arrived when he had concluded, the discussion on his paper was postponed until the May meeting in London.

The members afterwards visited Messrs. M'Corquodale's large printing works at Newton, the Pemberton Collieries, near Wigan, and the works of the Wigan Coal and Iron Company. In the evening they had their annual dinner at St. George's Hall.

THE FRENCH PATENT LAWS.

AGREEING with much (though not all) that is stated in the following article quoted from our esteemed contemporary, the *Mining Journal*, we gladly give it a place in our columns:—

It can scarcely be doubted that much of the opposition that has been offered both in this country and elsewhere to the recognition of patents for invention might be traced to the imperfect knowledge generally possessed as to the precise nature and object of patent laws, and as to the relative advantages which those laws secure to the patentee and to the public. Defining an invention as that which produces something that will secure to those who choose to adopt it an advantage which was not previously within their reach, it cannot be regarded as an injustice to require that the user shall pay something for the advantage he receives, on the same principle that he is required to pay for what he purchases to satisfy his other daily wants. To prevent him using another's goods or adopting a new invention without payment does not deprive him of anything which he before possessed, whilst by making such payment compulsory encouragement is offered to the possessors of goods or knowledge to place them in the market for the convenience of those who may wish to buy them. In the case of ordinary merchandise the question of ownership is so easily determined that the common system of sale and purchase affords ample protection to buyer and seller, but with knowledge as applied in invention the case is not so simple, because the details of the invention being once published everyone in the trade with which the invention is connected is at least as favourably placed as the inventor himself for the production of that which is invented.

Under these circumstances it is evident that the inventor will be disinclined to give his rivals in business the advantage of his superior knowledge unless he be suitably compensated; and well arranged patent laws afford the readiest means of enabling the community to secure an invention on reasonable terms, but terms that satisfy the inventor. The inventor is granted what is really no more than a royalty for a few years, on the condition that the invention becomes the undisputed property of the community at the end of that term. The inventor is thus always paid by results. If his invention be much wanted, and sold so cheaply as to create a market for it, his royalty during his term of protection well repays him for his ingenuity; if his invention be of little or no value, or if he demands more for it than would-be purchasers think just, the invention is ignored, and he gets no royalty. But it must be acknowledged that sometimes purchasers are too exacting if sometimes inventors are too grasping, and it is probable that if both parties were aware that the law is for their mutual advantage conflicts between inventors and those who could use inventions would be less common, and increased advantage would result to all concerned. In this country we have the manual of Goodeve, which supplies much information with regard to decided cases, and may afford some guidance to inventors and others in determining questions which arise from time to time in connection with patents; but we have nothing of the character of Dr. Malapert's Commentary on the French Patent Laws ("Nouveau Commentaire des Lois sur les Brevets d'Invention, suivi d'une instruction pratique avec Modèles d'Actes et Formules de Procédure." Par F. Malapert, docteur en droit, avocat à la Cour d'Appel: avec la collaboration de Jules Forni, avocat à la Cour d'Appel. Paris: Guillaumin et Cie, rue Richelieu), which in a large volume of nearly 500 pages, and obtainable for 8 frs. (6s. 6d.) supplies, in language readily intelligible to the ordinary workman and manufacturer, information and observation upon every point of importance either to inventors or the public which has been raised in the French Courts since the patent laws have existed in that country.

It must be assumed, says Dr. Malapert, that everyone has the right to divulge or keep the secret of his works and of his conceptions. Generosity would be no virtue if it were compulsory. So long as the inventor shall have kept his secret from others, and so long as no other shall have made the same discovery, it may be said that the secret is the property of its author. All at once the idea becomes known to the public, and it instantly becomes, whatever may be said to the contrary, the common property of all those who receive it. It is theirs from the moment they have understood it, and are in a position to put it in practice; it belongs to them as much as the air which they breathe, or the light which shines upon them. They are in the possession of the truth, which they have as much right to as the inventor (discoverer). Hence it follows that ideas and knowledge are not susceptible of appropriation by individuals, so that it must not be said that an invention when divulged can be property. Let us distinguish, then, between two periods, quite distinct, in the history of an invention. The first is that during which the inventor has kept his secret; the second follows the divulging of the discovery. There is a certain peril, however, for society not to have the secret of inventions, more than one having been lost on the death of its author, and only refound long after, which has caused large sacrifices of time and money. Thus Canon Schmidt practised lithography at Munich before Senefelder, who sought for a long time before he rediscovered a practicable process. For this long and troublesome efforts were necessary which might have been otherwise utilised, and this is only an example of a thousand similar cases.

Being useful to obtain the divulging of inventions the effort has been made to reconcile the interests of the State and of inventors, or, if the term be preferred, the pretensions of the community and those of individuals. Society has not been too exacting towards inventors, for it has declared that they are free to keep their secrets, but that if they will describe such secret accurately and completely they shall be secured a monopoly for a certain time. This is a contract offered to all inventors, in their own interest and in that of the progress of the arts, but they are free to accept or to refuse the bargain. If the inventors accept it the Government delivers to them a document, stating that on such a day, at such an hour, and at such a minute they have deposited the description of their invention. The greatest possible publicity is given to this deposit, and everyone is notified that no one must make similar products, or employ the processes invented until the expiration of the term fixed by the patent. The bargain made in good faith must be carried out in the same way. It must not be said that the inventor had a right of property, and that the State has taken his chattel; that is not true. The State has taken nothing from him; for, once more, he who has made a discovery and has divulged the secret is incapable to efface the knowledge. The State, on the contrary, by preventing the citizens subject to its laws from putting in practice certain ideas really infringes upon the liberty of labour. But it does so with full knowledge of the case. Its object has been to recompense the genius of the inventor, and to ensure that all and each shall be in a position in a given time to profit by an invention which will not be lost again.

The question of determining whether inventors have a right to property in their inventions is a capital one for an address, and little-wits, as Dr. Malapert remarks, have made it the subject of long dissertations. It is easy to utilise it for great efforts of eloquence. On the one hand they speak of the great men who have been sacrificed, and who have died without having enjoyed the fruits of their labour, and on the other hand they throw themselves into generalities against privileges, and ding into our ears the large word liberty. These discussions are of old date and will continue, but the disputants may rest satisfied that their addresses have never convinced anyone. The arguments, moreover, depend on hair splitting and equivocation. The law has no doubt its inconveniences, it favours the creators of futilities in the same way as it would have favoured Papin or James Watt. There is in this equality something shocking at first sight, but the law could not foresee and provide for each particular case. Again it is said that the term of protection is too short, that the time occupied in experimenting is fatal, and that the invention becomes open to the public before the author has profited by his invention. But this also has been taken into account by the legislature, and if the law had to be re-enacted to-day it would only be in matters of small detail that any alteration would be considered necessary.

After an admirable introduction explaining the nature and object of patent laws in which the insuperable objections to a preliminary examination are pointed out, and many other questions which have been subject to discussion in this country are considered, Dr. Malapert gives a chapter on the foreign patent laws explaining the cause of their diversity referring to the controversies which have taken place on the necessity of patents for invention, the result of which may be summed up in the conclusion of three competent reporters:—"Le principle des brevets d'invention est utile d'abord, legitimate ensuite;" and furnishing an outline of the International Congress of 1878 on industrial property. There is then a chronological index of the principal official documents relative to patents for invention from the date of the royal declaration of 1762 to that of the law of April, 1878 Next comes the full text of the law of July, 1844, which placed French inventors in the very favourable position they now occupy. The reader is thus well prepared for the exhaustive commentary which follows:—Each title and each article is taken in order, its object, utility, operation, and, if any, shortcomings are discussed and full particulars are then given of the various legal views and decisions which have been pronounced in connection with it, so that the privileges and responsibilities of the patentee can be accurately ascertained with the least possible trouble. The practical instruction which forms the concluding section of the volume will prove invaluable to inventors as it explains minutely what must be done, and the precise manner of doing it, whether it be desired to procure a patent, or to transfer or otherwise deal with it after it has been obtained. With regard to the reliability of the information given, which in a work of this class is of paramount importance, it will suffice to state that Dr. Malapert, who has regularly practised at the Paris bar since 1837, has a high reputation as a jurist, and has long given special attention to the particular branch of law connected with patents for invention, and that his colleague, Mr. Forni, also a practising barrister, is well worthy of being associated with him. The style and arrangement of the work leave nothing to be desired, and it is admirably printed on excellent paper. Altogether it is likely to enjoy a prominent position as an authoritative book of reference upon every legal question connected with French patent law; and it is understood that the importance of the work has been so fully recognised by the French Government that the learned doctor is about to receive the honour of a professorship in one of the public institutions, which, however, will not necessitate his throwing aside his barrister's robe or remove him from the Palais de Justice.

RETRIBUTION.

When life is perfect in its wedded sweetness,
Crowning thy womanhood with calm completeness,
And love's bright path is traced unto the end
Safe 'neath the gaze of one—thy husband—friend!
Then, may'st thou find his heart, now slighted, lost;
Its faith all slain, and thou left lonely, tost
Without the anchor of thine own esteem,
For that thou scorn'st love's truth, for sin's dark dream!

V. Gonville.

THE SCIENTIFIC REVIEW
AND
Scientific and Literary Review
(*Journal of the Inventors' Institute*)

Is published at the

OFFICES, 21, COCKSPUR STREET, CHARING CROSS.
LONDON, S.W.,

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THE INVENTOR'S INSTITUTE,

4, ST. MARTIN'S PLACE, TRAFALGAR SQUARE. LONDON.

ESTABLISHED 1ST MAY, 1862.

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SIR DAVID BREWSTER, K.H., LL.D., F.R.S., &c., from the establishment of the INVENTORS' INSTITUTE, till his decease, February, 1868. LORD RICHARD GROSVENOR, M.P.

President, SIR ANTONIO BRADY.

THE SESSION 1878—1879

Is Ended.

N.B.—The Balance Sheet, 1879, can now be inspected.

Subscriptions are payable to Mr. G. A. STRETTON, the Receiver, 4, St. Martin's-place, S.W., who is the proper official to give receipts.

F. W. CAMPIN, Sec.

Proceedings of the Institute.

The Institute being now out of Session, no meetings have been held.

No Executive Council business can be reported at present, except that it has been decided as desirable to have a dinner to inaugurate the new Session 1879-80.

Monthly Notices.

The Clothworkers' Company have voted £3,500 beyond the £10,000 previously voted for the buildings connected with the Leeds College of Science, which are to be devoted to dyeing and the textile industries. This company have also agreed to maintain this division of the school for five years at a cost of £1,200 per annum.

Eleven "New Elements" since June, 1877, have been brought forward, claiming places in the list of substances which will not admit of decomposition. Surely, says the *Athenæum*, it is time that some admitted authority should examine and revise this list.

Mr. H. A. Severn's Mariner's Compass causes an electric bell to be rung whenever the vessel is off her course. The captain of the ship sets the index hands to a certain angle, allowing the steersman a given latitude for deviation either to port or starboard. Should the ship be steered off her course beyond the limit allowed on either side an electric alarm bell rings, and continues ringing until the right course is resumed.

The death of Mrs. J. N. Lockyer, the wife of the editor of *Nature*, is announced. Mrs. Lockyer translated several scientific works into English, and translated them exceedingly well. She was only forty-two.

Formation of Hail is the subject (in the *Comptes Rendus*) of some interesting observations by M. G. Oltramare. M. Janin and other investigators have found that watery particles in mists may remain liquid at 6°·8 F., or even at – 4° F., provided there is no sudden shock. It is now shown that if, during this condition of "superfusion," there is a sudden discharge of electricity, the separating force disappears, and a union of particles takes place, forming hailstones of various magnitudes.

Dr. Wm. Jack has been appointed to the chair of Mathematics in the University of Glasgow, recently resigned by Prof. Blackburn.

The General Catalogue of Stars, second edition, observed at the United States Naval Observatory, is now issued. The first edition, published in 1873, contained places of all the stars, 10,658 in number, observed at Washington from 1845, and reduced to the epoch 1860. This new edition contains in addition the places determined since up to the year 1877, as these were chiefly done with the object of obtaining a greater number of observations of those stars in the former edition observed only once or twice in either element, not many additional stars are contained in it, and these, in order to retain the old numbering, and thereby prevent confusion, are inserted amongst the others, each with the number of the preceding star, but with a dash affixed for distinction (No. 3′, for instance, being the number of a star contained in the new edition only, and not observed before 1873). A very large number of the observations upon which this valuable catalogue is founded were made by Prof. M. Yarnall, of the U.S. Navy; their reduction into a catalogue and the printing of the catalogue were performed under his direction. We are sorry to state that after twenty-six years of assiduous labour at the Naval Observatory, Prof. Yarnall died suddenly on the 27th of last February, the completed volume only reaching him when he was already unconscious an hour before his death.—*Athenæum*.

Gas Exhibition.—The attempts to apply the electric light for general illumination have stimulated the gas companies to make great exertions. Recently they had, at Leeds, a very complete exhibition of gas apparatus for lighting and heating. Now the Gas Department of the Nottingham Corporation is to hold an exhibition of gas appliances in the Mechanics' Hall from the 24th to the 29th of November.

The President of the Institute of Chemistry offers two prizes of £50 each for the two best original investigations involving gas analysis.

St. John's Hospital for Cutaneous Diseases.—The 16th annual meeting of the friends and supporters of St. John's Hospital, Leicester-square, an institution specially devoted to the treatment of cutaneous diseases, was recently held at the Westminster Palace Hotel, Victoria-street, the Right Hon. W. N. Massey, M.P., in the chair. It is claimed for this hospital that it has proved a boon to all classes of the community, but especially so to the class of domestic servants, who when afflicted with infectious skin diseases were, as a rule, summarily dismissed from their situations, and might, but for this hospital, become veritable outcasts.

The Scientific Review
AND
SCIENTIFIC AND LITERARY REVIEW,
INCORPORATING THE "JOURNAL OF THE INVENTORS' INSTITUTE."

OCTOBER, 1879.

VERBAL AND PRACTICAL EDUCATION.

Another School Board Election for the Metropolis is about taking place, and this calls up again an important question that we have heretofore bestowed much attention upon, and which for the want of a better term we have usually designated *Technical* Education, though truly the kind of education referred to by us under that term was never intended to be technical in the sense of teaching the practice, or even the practical rules of any useful art, but simply so far technical that it was to be a system of instruction in science as far as, and with reference to, its application to arts and trades; in short, we have advocated making education practical and not simply literary, a system for disseminating the knowledge of things rather than the knowledge of words. Not that verbal or literary knowledge can be altogether discarded, but it may, and should be, as regards the education of the great mass of the people, rendered auxiliary to practical science. Doubtless over and beyond this it is desirable that encouragement be given to technical education proper, by prizes awarded to those who can show excellence in the practice of arts and trades; but we have never considered this latter aspect of the matter as of great national concern, since we believe our workshops are, notwithstanding the assertions of detractors, by no means inefficient as places of simple technical instruction. We do not acknowledge that British workmen are as mere handicraftsmen inferior to foreigners; though we believe the latter to be superior to the former as scientific and artistic practitioners of arts of utility, and we consider that in the present industrial struggle this difference is a momentous matter.

Such views as these naturally lead us to consider education of the verbal or literary kind, when applied to the masses, that proceeds beyond efficient instruction in the three R's (which we hold involves a passable knowledge of grammar) with the addition of some acquaintance with geography, to be simply waste of time; though it is certainly very desirable that by means of the reading lessons an acquaintanceship with the history and literature of our country should be obtained. By such means the keys of the temple of knowledge will be passed from hand to hand, and those who wish to unlock its portals can do so. For such as wish to obtain further utilitarian instruction, Institutions, Lectures, and Demonstrations on Science as applicable to arts and trades should be provided, and, to crown all, a Technical University, or Royal Technological Academy, should be established. We have no faith in knowledge got up to order, but we think much good may be done by affording every one facilities for obtaining such kind of knowledge as each person can appreciate and render useful to himself and his country. To our mind, in the practice of ordinary education, there is no greater folly than embarrassing a child's mind by multiplying the number of subjects to be "got by heart." Many subjects, like History, will be sufficiently well taught by simple reading lessons followed by suitable questioning.

To prevent misconception we must here remark that we are no enemies to Classical and literary learning; but we hold them to be luxuries which are useful in keeping up elegance in our language, and preserving polished society; but otherwise are of no national concern. Those whose bent of mind would lead them to become proficients in this kind of learning should be helped forward; but we think that the attainment of a mere superficial acquaintance therewith involves a lamentable waste of time. What our country wants is Science here, Science there, Science everywhere. Perhaps no better idea can be given of the real state of this question than has been set forth by the *Times*, which, in some remarks on the establishment of the South Australian University, which seeks to give great attention to the promotion of Scientific teaching, says:—South Australia has not much demand for pure scholarship or even for pure mathematics. South Australian parents are shrewd enough to perceive that a well-developed mind will not mine, and till, and trade to less advantage than one which has run wild. They are ambitious that their sons should have a certain refinement which comes of intellectual culture. But they think it ridiculous that young men should be furnished with information they apparently can never put to any use. With the whole universe of facts and knowledge to choose from, they do not understand why material should be selected to sharpen the mind which will be laid upon the shelf as soon as the youth is out of leading-strings.

For our part we consider these sentiments very just and appropriate, and as directly applicable to this country as to South Australia; in fact, more so, inasmuch as we have amongst us a good supply of classical and literary scholars of eminence, hence we need not trouble ourselves about increasing the number of them. If we want anything done in reference to scholarship, whether as regards classical and literary knowledge or pure science, it is in respect to better provision for those who are so proficient therein as to be capable of advancing our learning; in short, we want "payment by results" carried into higher regions than those at present assigned to it.

Here we cannot help remarking that when education becomes well distributed amongst the people at large it will be absurd to hinder its being rendered practically available for the benefit of the country by keeping the laws which guarantee remuneration for intellectual labour, namely, the Copyright and Patent Laws in the state they are now in.

We live in days of commercial and industrial depression, and the place of highest importance must therefore be assigned to everything that will be likely to remove this depression and, if possible, prevent any recurrence of it, and we cannot conceive anything more likely to effect all this than education in practical science, followed up by good Patent and Copyright Laws.

THE BRITISH ASSOCIATION.

AUGUST 22ND.

MATHEMATICAL AND PHYSICAL SECTION.

Dr. Grabham, F.R.C.P., gave an interesting account of observations of atmospherical electricity in the Island of Madeira, and pointed out the suitability of so constant a climate to work of this kind. He described the electricity of various winds and currents, showing for the first time in the history of the Association, a long series of sub-tropical records of great value.

A short discussion followed, which closed with a cordial vote of thanks to the author.

BIOLOGICAL SECTION—DEPARTMENT OF ANTHROPOLOGY.

Dr. E. B. Tylor, one of the vice-presidents of the Biological section, delivered an address to the department of Anthropology. There was a crowded and brilliant attendance, including a large number of ladies, for whom the discussion of anthropological questions has apparently lost none of its charms. Dr. Tylor commenced his address with a startling retrospect. He asked what, looking back 4000 to 5000 years, was the appearance of mankind as disclosed to us by the Egyptian monuments and inscriptions? Several of the best marked races of man were already in existence, including the brown Egyptian himself, the dark white Semitic man of Assyria or Palestine, the Central African of two varieties, which travellers still find as distinct as ever, namely, the black or negro proper and the copper-coloured negroes, like the Pongo or Nyam-Nyam of our own time. Indeed, the evidence accessible as to ancient races of man goes, says Dr. Tylor, to prove that the causes which brought about their differences in types of skull, hair, skin, and constitution, did their chief work in times before history began. Since then the races which had become adapted to their geographical regions may have, on the whole, undergone little change while remaining there, but some alterations are traced as due to migration into new climates. Even these are difficult to follow, marked as they are by the more striking change produced by intermarriage of races. Now, the view that the races of men are to be accounted for as varied descendants of one original stock is geologically probable from the close resemblance of all men in body and mind, and the freedom with which races intercross. If it was so, then the fact of the different races already existing early in the historical period compels the naturalist to look to a prehistoric period for the development to have taken place in; and, considering how strongly differenced are the negro and the Syrian, and how slowly such changes of complexion and features take place within historical experience, this pre-historic period was probably of vast length. The evidence from the languages of the world points in the same direction. In times of ancient history we already meet with families of languages, such as the Aryan and Semitic, and, as later history goes on, many other families of languages come into view, such as the Bantu or Nafir of Africa, the Dravidian of South India, the Malayo-Polynesian, the Algonquin of North America, and other families. But what we do not find is the parent language of any of these families—the original language of which all the other members are dialects; so that this parent tongue should stand towards the rest in the relation which Latin holds to its descendants, Italian and French. It is, however, possible to work back by the method of philological comparison, so as to sketch the outlines of that early Aryan tongue which must have existed to produce Sanskrit and Persian, Greek and Latin, German, Russian, and Welsh, or the outlines of that early Semitic tongue which must have existed to produce Assyrian, Phœnician, Hebrew, and Arabic. Though such theoretic reconstructions of parent languages from their descendants may not only show a vague and shadowy likeness to the reality, they give some idea of it, and what concerns us is that theoretical early Aryan and Semitic or other such reconstructed languages do not bring our minds appreciably nearer to really primitive forms of speech. However far we get back the signs of development from still earlier ages are there. The development of civilisation requires a long period of pre-historic time. Experience and history show that civilisation grew up gradually, while every age preserves recognisable traces of the ages which went before. The woodman's axe of to-day still retains much of the form of its ancestor, the stone celt in its wooden handle. The mathematician's tables keep up in their decimal notation a record of the early ages when man's ten fingers first taught him to count. The very letters used in writing may be followed back to the figures of birds and beasts, and other objects drawn by the ancient Egyptians, at first as mere picture writing, to denote the things represented. Yet, when we learn from the monuments what ancient Egyptian life was like 5000 years ago, it appears that civilisation had already come on so far that there was an elaborate system of government, an educated literary priesthood, a nation skilled in agriculture, architecture, and metal work. Even if it could be proved that the flint implements of Abbeville or Torquay are not really so ancient as the pyramids of Egypt, this would not prevent us from still assuming, for other and sufficient reasons, a period of human life on earth extending many thousand years further back. There appears no particular reason to think that the relics from the drift beds or bone caves represent man as he first appeared on the earth. The contents of the caves especially bear witness to a state of savage art in some respects fairly high, and which may possibly have somewhat fallen off from an ancestral state in a more favourable climate. Indeed, the savage condition generally, though rude and more or less representing early stages of culture, never looks absolutely primitive, just as no savage language ever has the appearance of being a primitive language. Naturalists not unreasonably claim to find the geographical centre of man in the tropical regions of the old world inhabited by his nearest zoological allies, the anthropomorphous apes. In such a view, added Dr. Tylor in conclusion, there was enough to make careful quest of human remains worth while in those districts in the equatorial forest regions from Africa across the Eastern Archipelago.

At the close of the address, Sir John Lubbock moved a vote of thanks to Dr. Tylor.

Professor Huxley, in seconding it, complained that fuller information was not supplied.

Dr. Tylor, in reply, said he had propounded theories which he believed to be true, and for their confirmation it was an absolute matter of necessity that he should rely on the researches of geologists and others.

MECHANICAL SECTION.

Mr. John Hollway described his new process in metallurgy for the melting of sulphide ores. Mr. Hollway pointed out that pyrites and ore sulphides can be decomposed and fused by the heat developed in the oxidation which take place whenever air is rapidly brought in contact with an excess of molten sulphides. He added that, where sufficient water power is available, a plant capable of treating 15,000 tons of pyrites can be erected at a cost of £1,000. On account of its simplicity and economy, it is expected that the new process will take the place of the ordinary smelting and also of the wet processes now in use.

GEOLOGICAL SECTION.

Professor Duncan presided. A report was presented by Mr. Pengelly describing his explorations in Kent's Cavern, Torquay; and Professor Adams, of King's College, London, contributed a paper relating to the discovery of a bone cave near Cappagh, in the county of Waterford. The cave is tunnel-shaped, and when discovered was full of stratified deposits. The upper stratum contained bones representing man, pig, horse, red deer, ox, goat, sheep, dog, wolf, fox, marten, hare, rabbit, and birds. Charcoal occurred frequently, and various implements of stone and iron were also found. The second stratum contained bones, and on removing a floor of stalagmite the explorers found the bones of a large bear embedded in it. Dr. Evans reported on the bone caves of Borneo, and Professor Hawkins upon those of Derbyshire.

AUGUST 23RD.

PHYSICAL AND MATHEMATICAL SECTION.

Mr. Merrifield took the chair at the meeting of this section, which was held in Firth College.

A paper was read by Mr. J. C. Allen on "Some Problems in the Conduction of Electricity," the principal object of which was to solve the problem of the conduction of electricity in a spherical current sheet, the electricity being introduced and carried off from the sheet at any number of points called electrodes. Papers were also read by Mr. A. Macfarlane, Mr. W. H. L. Russell, Mr. H. M. Jeffry, and Mr. Donald M'Alister, on "The Fundamental Principles of the Algebra of Logic," on "A neglected Theorem in Linear Differential Equations," on "The Repulsion of Wires influenced by Electric Currents," and one or two equally abstruse subjects.

GEOEOGICAL SECTION.

In this section Mr. E. Wilson read a paper on "The Age of the Penine Chain," in which he combated the generally-accepted view of the post-Permian origin of the chain and contended for a pre-Permian upheaval. In support of this opinion the following facts were cited:—The Yorkshire coal-basin was admittedly pre-Permian, for north of Nottingham the magnesian limestone everywhere overlapped the coal measures; but the axis of this basin was parallel with and was evidently determined by the same series of movements that upraised the Penine chain. The Permians disappeared on the west in approaching the Penine chain; in this direction also the marl slates attenuated, and the marl slates and magnesian limestone became more sedimentary, as if approaching a margin. Mountain limestone pebbles occurred in Permian breccias on one or both sides of the Penine axis. Many fragments of carboniferous rocks occur in lower bunter sandstone (breccias) on the borders of Notts and Derbyshire; but Mr. Wilson said he found no fragments of Permian rocks in these breccias. No outliers of Permian rocks were discovered at any distance west of the magnesian limestone escarpment between Nottingham and Northumberland. The character and succession of the Permians on the two sides of the Penine chain were very dissimilar.

A paper was afterwards read by Dr. J. Phené on "The Deposit of Carbonate of Lime at Hierapolis, in Antolia, and the Efflorescence of the Limestone at Les Baux, in Provence." The author said he had selected these two distant sites of calcareous deposit, not alone for their picturesque beauty and effect, but because they presented, he believed, the two most widely differing conditions of a somewhat similar material probably to be found. In the former case, the deposit of lime was so rapid that a large extent of country was covered with it. Its forms were eccentric and yet so beautiful that there was hardly any style of ornament the simulation of which would not be found in it. The Roman city, which took the place of a former Grecian one, was half submerged beneath a sea of rock of intense hardness, which, blocking up streets, temples, and vast arches, after reaching to a certain hight, the level of its source, ran over the natural aqueducts which it formed as it went, and began new ones lower down, which it again and again, as it reached the level of its source, repeated. Part of the deposit was perfectly white, the other part quite black, giving the most singular appearance, as it looked like a snow drift lying in the intensely hot sun of Asia Minor, or a cataract of snow falling over black rocks, or a frozen cascade, which could only be illustrated in drawing by giving a representation in black and white, while the other parts of the landscape were in their natural colours. The Turks called it Pambuk Kalessi, or Castle of Cotton, from its whiteness. The hardness of this deposit, and the rapidity of its formation, contrasted strangely with the stone at Les Baux, which, though by no means soft to cut, had from its natural cavities suggested the idea to the founders of the city of excavating their houses in the sides of the rocks quite as much as they built them outwards. This rock, with little or no warning, disintegrated and discharged itself in efflorescence in the air, producing an effect as destructive to the city built there as in the former case, with quite as picturesque an effect, though from an exactly opposite cause. So much was being done now in ascertaining the component parts of stone for the purpose of hardening, as in the recent experiments on the Houses of Parliament, Cleopatra's Needle, and other well-known works, that it occurred to him that an analysis of these two rocks of similar component parts, but with varying conditions, would be well worth the attention of the chemist and the practical constructor. The paper was illustrated with views of Hierapolis.

Mr. M. Blair read a paper on the rocks excavated for the Town-hall, Paisley, the frontage of which towards the river was, he said, 22ft. below the bed of the stream. A crystallised dolerite appeared under the boulder clay in company with granite boulders. The origin of this dolerite had not yet been ascertained.

Biological Section.

Only one of the three departments into which this section is divided—Anthropology—met to-day. Dr. Tylor presided, and there was a large attendance.

The Chairman said the department would be addressed by three well-known African explorers, who had, he had no doubt, much interesting information to impart as to the people of Africa, their habits, customs, and religion.

Commander Cameron spoke on the subject of Urua, in Central Africa, one of the largest native States in Africa. In reply to questions put to him, Commander Cameron said he did not know of an instance in which a European had obtained fire by friction. It was simply a question of "knack" which must be acquired in early youth. He had never traced any religious or superstitious connexion in the custom of wearing skins, though caste was so mixed up with their religion that doubtless there was something in it which he had been unable to make out.

Dr. Gladstone pointed out the necessity which existed for the adoption of a uniform spelling for the expression of different sounds. Such a system would very much facilitate the understanding of the relationship of one language to another, and the ready pronunciation of words.

Sir Rawson Rawson said the Geographical Society had appointed a committee for the consideration of the question, commencing with the Indian languages. The Indian Government had lately prepared a list of the names of places in the Indian empire which they wished adopted by their officials. The lines laid down by the Geographical Society would no doubt become the lexicon of geographers with regard to Indian names. The same was about to be done with regard to African names.

Commander Cameron, in answer to further questions, said he believed the people recognised some kind of supreme deity, though the chief arrogated a large amount of divinity to himself.

Mr. Black said he was not aware that there was a list being prepared for the Indian Government such as had been referred to by a previous speaker, and great inconvenience was felt in consequence. The question was mooted about 100 years ago, and he believed the Indian Government had been talking about it ever since. He had hopes that the Geographical Society would step in and settle the whole question while the Government was talking about it.

The Chairman said he was inclined sometimes to doubt the wonderful stories they heard from African travellers, but it was remarkable how the truth of the stories had been demonstrated. As to the mutilations in Urua, they reminded us of our ancestors about 2,000 or 3,000 years ago. We had greatly changed, but the habits of this African race remained to show us some of the very graphic ways of keeping society in order. He was sure the meeting would thank Commander Cameron for his address. (Applause).

Commander Cameron replied, and then

Major Pinto spoke on the native races of the head waters of the Zambesi. He said that the district of country in which he had spent a considerable period was inhabited by a race of people one section of which seemed to have come from the north and the other section from the south. In Bihe—the district to which he referred—he thought it was clear there was a mixture of races. There were negro characteristics, such as curly hair, thick lips, &c., but some of the people had Caucasian features, and they might very well, so far as features were concerned, pass for Europeans. Portions of this race must have come into the country within a century. Some of them were great hunters, and others near the streams cultivated the land. The hunters were very brave, and attacked the elephant without spears or anything beyond a simple bow and arrow. He thought this was very rare, poisoned arrows and spears being used always where the natives had not guns. The people were very fond of their beards, and ornamented them with great delight. The people living in the Ambula district cultivated the land, and irrigation was practised. He had seen women in the districts of which he was speaking who, if they were of a lighter complexion, would be considered extremely handsome in Europe. The people in the Ambula live on roots, which were not particularly nutritious, but the people were remarkably strong.

The Chairman said he was sure he should carry out their wishes in thanking Major Pinto for his very curious account of the races of the head waters of the Zambesi. His description of the people of the negroid and somewhat fair complexion and Caucasian cast of features indicated a most puzzling mixture of race. How far Portuguese intermixture was the cause of this fairness of complexion was an interesting question.

Commander Cameron said there was a considerable amount of civilisation among the people of Bihe. The best cotton cloth was made there, and the houses were square, which was a great advance upon the ordinary round hut of the savage. The inhabitants of Bihe also had some ideas of art, for on the whitewashed walls of their houses were to be seen pictures of processions; and in the cases of persons who had been to the coast rough delineations of horses and carts. When he left the Tanganyika he followed the course of the rivers Rujumba and Rubumba, one following east and the other west; and a short distance north of these streams there was said to be a district inhabited by a leprous race, who were avoided with repulsion by the surrounding people. As to irrigation he had never heard of actual river deposit being used for cultivation; but in some districts, where the country was dry, a certain amount of irrigation was used in the rice-grounds. In the districts where rice was much grown it was usually grown in places which were swamps during the rainy season.

Count S. de Brazza followed with an address on the native races of the Gaboon and Ogowa. He spoke highly of the generous sentiments of the people, and he had himself experienced great kindness in the cannibal country. The people ate the hearts of their brave enemies, believing that by so doing their own courage would be increased. Those who supposed that cannibals were wanting in generous feelings made a great mistake. He also spoke of a race of dwarfs, known as the Akas.

Major Pinto confirmed Count de Brazza's view of the cannibal character, which was misunderstood. The cannibals had many good qualities, and were not altogether the savages they were frequently painted. Cannibals had been known to die defending European travellers.

The Chairman said he thought after the glowing accounts they had heard from the two distinguished explorers who had just addressed them of the generosity, loyalty, virtue, and bravery of the cannibal races, we should feel it necessary to show our high standing in civilisation by adopting the same customs. He trusted, however, that nobody would eat anybody else at the next election. (Laughter). The researches which had been made showed how much truth there was in the stories of old travellers as to the existence of dwarfs in Central Africa.

Commander Cameron said that he always considered that cannibalism was one of the first stages towards civilisation. (Laughter). There was no doubt that the cannibal had many good qualities.

A vote of thanks was passed to Major Pinto and Count de Brazza, after which the section adjourned.

In the evening the Mayor of Sheffield (Alderman David Ward) gave a banquet in the Cutlers' Hall, at which most of the leading members of the Association attended. His worship had on his right the President of the British Association (Dr. Allman) Major Pinto, M. de Brazza, and the Rev. S Haughton, and on his left the Archbishop of York, Sir A. Armstrong, Captain Douglas Galton, and others. The guests numbered about 500.

August 24th and 25th.

Chemical Science Section.

Mr. W. H. Watson, F.C.S., read a paper "On the Detection of Milk Adulteration." From analyses of milk from various dairies and by a comparison of the results obtained, with the circumstance existing as to the character and quantity of the food, nature of different cows, conditions and healths of them at particular periods and changes of the seasons of the year, the author concludes that cows' milk is subject to considerable variation in composition. He had found in many instances milk from well-fed healthy cows to contain as little as 10·5 per cent. of total solids and from 8·5 to 9 per cent. of solids not fat. The results of other experiments are compared, and he suggests that the present limits adopted by public analysts for genuine milk should be reconsidered.

In the discussion which followed, Prof. Wanklyn, of St. Thomas's Hospital, remarked that since the Adulteration Act had been put in force several thousand milk-dealers throughout the country had been fined on the faith of the standards, and, if the standards themselves were not warrantable, many of those persons had mainly to thank him for having been fined. He had always had the courage to rely on chemical work when submitted to full discussion, and he took upon himself the responsibility of advising, and to some extent forcing. the adoption of the standards, but he would not take upon himself the responsibility of stopping the discussion of the standards. He contended that there was great regularity in the composition of milk. If they took all the milk in England to-morrow and analysed it, the solids not fat would be found to be 9·3 per cent., but the total solids in milk were not so constant as the solids not fat. The practice he followed was to state the results of his examination of milk in the terms of the standard, 9·3, but to refrain from what was practically advising prosecution unless something like 10 per cent. of water was found. It was important to take the mean standard, because if they took a low standard they would be licensing all the milk-dealers in the country to adulterate their milk. He, therefore, advised analysts to take the mean standard, and as a rule not to recommedd action unless 10 per cent. of water was shown.

Mr. H. A. Allen complained that Mr. Watson's paper, while containing a number of things which, if new, were not true, and if true were not new, would produce a feeling that injustice was done to a certain class of traders. As a public analyst, he (Mr. Allen) had a larger district under his charge than any other analyst in England, and he could endorse every word Prof. Wanklyn had uttered. If a man sold bad milk, whether natural or artificial, there was *prima facie* evidence to condemn him. The standard should be that of average milk, and a prosecution should not be commenced unless the milk fell decidedly below the standard. He recommended the enactment of a standard.

Mr. W. Thompson, of Manchester, urged that the Act had produced adulteration, because, before it came into operation, a milkman did not know what a chemist's power was, and was afraid to water his milk. Now, however, he knew how far he could go, and he adulterated his milk to that extent, so that the public obtained an article of proportionately low quality.

Dr. Gilbert said he had investigated the milk question, and was surprised to find how little variation there was in genuine milk.

Prof. Williamson and Dr. Dewar, the president, thought no blame attached to Mr. Watson for having presented to the section the facts which he had ascertained as the result of his own observations.

AUGUST 27TH.

The meeting was brought to a close today, and though it cannot be justly described as one of the most brilliant in the annals of the Association, has nevertheless been marked by a large measure of success. Great pains had obviously been bestowed by the people of Sheffield on the arrangements which were made for the reception of their guests, and the evidences of a desire to give them a cordial welcome were manifested on every side. The most liberal hospitality was extended to them, and their stay in the town was in many ways rendered as pleasant as assiduous attention could make it. The members of the Association did not, however, muster in such force on the present as on many previous occasions. At the meeting in Dublin last August 2,578 tickets were sold, but this year the number did not exceed 1,404, leaving the Plymouth meeting, however, behind. The sectional meetings were for the most part well attended, especially on the opening days, and the lectures which were given on Saturday evening by Prof. Ayrton "On Electricity as a Motive Power," and on Monday by Dr. Lankester "On Degeneration," attracted large audiences to the Albert Hall. The weather, which at the outset threw a damp on the proceedings, left little to be desired for the last three or four days of the meeting, and those who took part in the excursions could scarcely have seen under more favourable circumstances the beautiful country by which Sheffield is surrounded. In the town itself, the great manufactories, which were freely thrown open to the inspection of the members of the Association, and the variety and magnitude of the operations which are carried on there, furnished them with the means of passing some hours each day very pleasantly. At the Cyclops Steel and Iron Works of Messrs. Cammell and Co. they yesterday had the opportunity of witnessing the interesting process of rolling an armour plate, and at the works of Messrs. Frith to-day the casting of a steel gun. The "conversations" in the Cutlers' Hall were also made to contribute not a little to their instruction as well as amusement by a series of experiments with the telephone and numerous other scientific instruments. The meeting, in short, afforded reciprocal pleasure to the visitors and the visited, and the former can hardly fail to bear away with them from Sheffield the memory of much that may serve as matter for agreeable reminiscence.

The various resolutions of the General Committee we reprinted in last month's issue.

PROTECTION OF SHIPS FROM LOSS BY FIRE AND FROM LOSS BY SINKING.

FOTHERGILL GOLD MEDAL.

Under the control of a committee consisting of Thos Brassey, M.P., B. Francis Cobb, Esq., Lord Alfred Churchill (Chairman of the Council of the Society of Arts), Rear-Admiral Nolloth, Captain Price, R.N., M.P., Admiral A. P. Ryder (Chairman of the Committee), and Captain H. Toynbee, F.R.G.S., F.R.A.S., the Fothergill Gold Medal is offered for the best means of attaining the two above-mentioned combined objects.

A Silver Medal will be given for the best means of protecting ships from fire.

A Silver Medal will be given for the best means of protecting ships from sinking.

The receiver of the first silver medal may receive, also, the second, if the means proposed be deemed the best for each of the two objects considered apart from the other, although not deemed the best means of attaining the two objects combined—to which alone will the Gold Medal be awarded.

The following are the conditions of this offer:—

Protection of Ships from Sinking, after Collision, after Touching the Ground, &c.—Silver Medal.—The Society of Arts offer their Silver Medal for the best means of preventing a ship from sinking, after collision, after touching the ground, or from any other cause, or for delaying sinking as long as possibly by—1. Structural arrangements; 2. Appliances, non-structural.

1. Preference will be given to structural arrangements which occupy the least amount of valuable space, and interfere least with the stowage of important articles.
2. Preference will be given to appliances which are the least unsightly, the most ready at hand, and require least "fitting" for immediate use.
3. Preference will be given to structural arrangements least obstructive to free ventilation.
4. Preference will be given to structural arrangements least expensive, as to first cost and repair.
5. Preference will be given to appliances which are least expensive, which occupy least space, which are least liable to injury, and which are most trustworthy.

Competitors are at liberty to draw a distinction between structural arrangements and appliances most suitable to men-of-war, to passenger ships, to ordinary merchant ships; also between the different circumstances attending accidents by day and accidents by night.

Protection of Ships from Fire.—Silver Medal.—The Society of Arts offer their Silver Medal for the best means of preventing or extinguishing fire on board ships by—1. Structural arrangements for preventing fire; 2. Structural arrangements for aiding in the extinction of fire; 3. Appliances for extinguishing fire.

1. Preference will be given to structural arrangements which occupy least amount of valuable space, and interfere least with the stowage of important articles.
2. Preference will be given to appliances which are least unsightly, the most ready at hand, and require least "fitting" for immediate use.
3. Preference will be given to structural arrangements least obstructive to free ventilation.
4. Preference will be given to structural arrangements least expensive, as to first cost and annual repair.
5. Preference will be given to appliances which are least expensive, which occupy least space, which are least liable to injury, and which are most trustworthy.

Competitors are at liberty to draw a distinction between structural arrangements and appliances most suitable to men-of-war, to passenger ships, to ordinary merchant ships; also between the different circumstances attending a sudden alarm of fire by day and sudden alarm by night.

Models or drawings of structural arrangements and of appliances must be sent in not later than the 1st January, 1880, addressed to the Secretary, Society of Arts, John-street, Adelphi, London, W.C., and must in every case be accompanied by a short description.

The Council is at liberty to withhold the medals if, in the opinion of the Committee, nothing is submitted worthy of the award.

MILITARY TRAMWAYS.

THIS subject, being of particular interest at the present moment, a distinguished Indian and Colonial official company visited the United Service Institution, on Tuesday, to inspect Mr. Haddan's system of military tramways which has been specially designed to meet the peculiar requirements of the new Afghan campaign upon which we are now entering.

Mr. Haddan drew attention to the great injury done to commerce by the military system being unprovided with its own peculiar means of transport, since it was anything but commercial to allow a war to upset the trade of a country by ruining its civil transport force, or at any rate greatly disturbing it and driving it, perhaps, into other channels. He quoted the loss of 60,000 camels, or about one-third of the Punjaub trading power, as being equivalent to a loss of £200,000,000 in England—*i.e.*, one-third of our home railway capital.

This fearful loss has been incurred by our own people, and would be analogous to the Franco-German indemnity, except that the victors are the victims in this case.

The physical value of his flying railway as an occupative force was also pointed out as enabling us both to eat and have our pudding—since such a rapidly-installed railway, having first paid its own expenses over and over again as a military carrier, would act as the most efficient peacemaker in leaving behind the conquerors, at no expense, the essence of trade transport; which, General Hamley assures us, is the only possible means of conquering the hill tribes, who are brigands more from necessity than choice, an option our own frontier tribes will be driven to accept when the inevitable famine attendant on want of transport puts in its appearance a few months hence.

Mr. Haddan gave it as his experience of Turkey and India that money cannot replace the loss of a physically active medium in out-of-the-way countries, isolated as they are from trade centres; and therefore considers the Government are bound to replace the animal power lost by some mechanical expedient, which will either enable the decimated animals to do the work of ten, or forests to be converted into power by the intermediary of steam.

An ordinary railway was, he said, quite out of the question, for it could not be constructed rapidly enough to be of any military use, while its costly works offered fatal prizes for inciting attack and cutting the communications for months. Something easily re-installed was what was wanted.

The so-called *light* railways next came in for his strictures. The lecturer explained that Indian experience had shown them to be "catch pennies," offering a cheap article, if measured by the length, which was purposely spun out *ad nauseam*, but ruinous in the matter of working expenses, and one and all dependent upon a freshly-made earthen foundation, which experience had shown would never successfully resist the vagaries of tropical rains even after years.

Mr. Haddan insisted upon the necessity of affording the public means to judge for themselves whether a line could pay or not; for he maintained that the day of railways, being used by financiers as a peg to hang their rotten cloaks upon, was fled for ever.

Based upon Mr. Juland Danver's admirable reports upon Indian Railways, he found that £13 per ton carried was the limit of capital per mile which could be expended to ensure a dividend of 5 per cent. The Indian railways average about £37 capital per mile per ton carried daily. On this commercial basis powerful friends had offered to build the Indian Government 500 miles of Pioneer Railway in six months, without a farthing outlay, present or future, upon their part, provided the Government would guarantee a daily traffic of 200 tons on the existing railway tariff, which is only about 1-406th of the rates paid for the utterly unreliable and limited means of transport now used. Ex.: 200 tons daily traffic multiplied by £13 gives us a capital of £2,600 per mile, and a dividend thereon of 5 per cent., but as the Pioneer would not cost more than half this sum, while it works at far less than Indian working charges, an immediate dividend of 20 per cent. is confidently expected.

The tramway exhibited was a model of sublime simplicity, in fact it looked too simple to be capable of producing such astounding commercial results. The permanent way consists merely of a race-course looking fence, composed of a single rail supported upon posts about three feet high, across which the load is slung astride in donkey and pannier fashion. Thus the inequalities of the ground were ignored and the tropical rains unobstructed, the rail being always kept high and dry, and consequently out of the reach of the elements, which invariably upset the niceties of supply calculation upon which the transport of an army so utterly depends. When used as a tramway no locomotive is required, since the load is towed by animals trotting along anywhere alongside. The animals, however, are confined to the ascents, and are stationed all along the route upon the etapen system, and thus never leave their beats. Descents are worked by gravitation, while streams, ravines, and places not readily accessible to animals would be also worked by either natural or artificially obtained gravitation. Rolling stock there is none; the packing cases being yoked together in pairs upon temporary wheels, which cost but a few shillings. Hence, the whole of the carrying power of the line would be used in *forwarding* supplies, there being no return empties—the curse of all single lines, and especially of military transport in general. The rail used may be of iron, if handy; but, owing to a special arrangement of the load by which the weight is entirely supported by the posts, and never bears upon the span, bamboos, poles, or planks answer the purpose equally well; so that his tramway could be at once installed without sending from England anything more cumbersome than instructions.

Mr. Haddan also stated that what killed the mules and camels was there being obliged to stand laden for hours until their advance bit by bit could be organised. Often the period of waiting amounted to 75 per cent. of a day's work.

DISINFECTANTS AND HOW TO USE THEM.

THE National (U.S.) Board of Health, consisting of a number of leading physicians and chemical experts, of which Prof. C. F. Chandler is chairman, have issued the following instructions for disinfection, intended especially for the guidance of physicians and nurses in the yellow fever districts, but which are equally applicable in other classes of contagious diseases. In submitting this report the chairman says:—

It has been the aim of the committee to prepare concise directions for disinfection, so simple and clear that they may be easily followed by any person of intelligence. In the selection of disinfecting agents the aim has been, first, to secure agents which can be relied upon to accomplish the work; secondly, which can be procured in a state of comparative purity in every village in the United States; thirdly, so cheap that they can be used in adequate quantities. It is extremely important that the people should be instructed with regard to disinfection. They must be taught that no reliance can be placed on disinfectants simply because they smell of chlorine or carbolic acid, or possess the colour of permanganate, and that, in general, proprietary disinfectants with high-sounding names are practically worthless, as they either have no value whatever, or, if of value, cost many times as much as they are worth, and cannot be used in sufficient quantity.

EXPLANATIONS.—Disinfection is the destruction of the poisons of infectious and contagious diseases. Deodorizers, or substances which destroy smells, are not necessarily disinfectants, and disinfectants do not necessarily have an odour. Disinfection cannot compensate for want of cleanliness or of ventilation.

I.—DISINFECTANTS TO BE EMPLOYED.

1. Roll sulphur (brimstone) for fumigation.

2. Sulphate of iron (copperas) dissolved in water in the proportion of one and a half pounds to the gallon: for soil, sewers, &c.

3. Sulphate of zinc and common salt, dissolved together in water in the proportions of four ounces sulphate and two ounces salt to the gallon: for clothing, bed linen, &c.

NOTE.—Carbolic acid is not included in the above list for the following reasons:—It is very difficult to determine the quality of the commercial article, and the purchaser can never be certain of securing it of proper strength; it is expensive when of good quality, and experience has shown that it must be employed in comparatively large quantities to be of any use; it is liable by its strong odour to give a false sense of security.

II.—HOW TO USE DISINFECTANTS.

1. In the sick-room.—The most available agents are fresh air and cleanliness. The clothing, towels, bed linen, &c., should at once, on removal from the patient, be placed in a pail or tub of the zinc solution, boiling hot if possible, before removal from the room. All discharges should either be received in vessels containing copperas solution, or, when this is impracticable, should be immediately covered with copperas solution. All vessels used about the patient should be cleansed with the same solution. Unnecessary furniture—especially that which is stuffed—carpets, and hangings, when possible, should be removed from the room at the outset; otherwise, they should remain for subsequent fumigation and treatment.

2. Fumigation with sulphur is the only practicable method for disinfecting the house. For this purpose the rooms to be disinfected must be vacated. Heavy clothing, blankets, bedding, and other articles which cannot be treated with zinc solution should be opened and exposed during fumigation, as directed below. Close the rooms as tightly as possible, place the sulphur in iron pans supported upon bricks, set it on fire by hot coals or with the aid of a spoonful of alcohol, and allow the room to remain closed for twenty-four hours. For a room about ten feet square at least two pounds of sulphur should be used; for larger rooms, proportionally increased quantities.

3. Premises—Cellars, yards, stables, gutters, privies, cesspools, water closets, drains, sewers, &c., should be frequently and liberally treated with copperas solution. The copperas solution is easily prepared by hanging a basket containing about sixty pounds of copperas in a barrel of water.

4. Body and bed-clothing, &c.—It is best to burn all articles which have been in contact with persons sick with contagious or infectious diseases. Articles too valuable to be destroyed should be treated as follows:—

a. Cotton, linen, flannels, blankets, &c., should be treated with the boiling hot zinc solution, introducing piece by piece, securing thorough wetting, and boiling for at least half an hour.

b. Heavy woollen clothing, silks, furs, stuffed bed covers, beds, and other articles which cannot be treated with the zinc solution, should be hung in the room during fumigation, pockets being turned inside out, and the whole garment thoroughly exposed. Afterwards they should be hung in the open air, beaten, and shaken. Pillows, beds, stuffed mattresses, upholstered furniture, &c., should be cut open, the contents spread out and thoroughly fumigated. Carpets are best fumigated on the floor, but should afterward be removed to the open air and thoroughly beaten.

5. The corpses should be thoroughly washed with a zinc solution of double strength, then wrapped in a sheet wet with the zinc solution, and buried at once. Metallic, metal-lined, or air-tight coffins should be used when possible, certainly when the body is to be transported for any considerable distance.

THE CONSCIOUSNESS OF PAIN IN INFERIOR ANIMALS.

PROF. T. RYMER JONES, in writing of crustaceans, takes occasion to make the following remarks in regard to the susceptibility to pain of these and other animals. Is it really true in philosophy, says he, as it has become a standing axiom in poetry, that—

> "The poor beetle, that we tread upon,
> In corporal sufferance feels a pang as great
> As when a giant dies?"

This is a question upon which modern discoveries in science entitle us to offer an opinion, and the result of the investigation would seem to afford more enlarged views relative to the beneficence displayed in the construction of animals than the assertion of the poet would lead us to anticipate.

Pain, "Nature's kind harbinger of mischief," is only inflicted for wise and important purposes—either to give warning of the existence of disease, or as a powerful stimulus prompting to escape from danger. Acute perceptions of pain could scarcely, therefore, be supposed to exist in animals deprived of all power of remedying the one or of avoiding the other. In man the power of feeling pain is indubitably placed exclusively in the brain; and if communication be cut off between this organ and and any part of the body, pain is no longer felt, whatever mutilations may be inflicted. The *medulla spinalis*, which corresponds to the ventral chain of ganglia in articulated animals, can perceive external impressions and originate motions, but not feel pain; hence we may justly conclude that in the articulates likewise, the supra-œsophagal ganglia, the representatives of the brain, and the sole correspondents with the instruments of the higher senses, are alone capable of appreciating sensations of a painful character. Thus, then, we arrive at a very important conclusion, namely, that the perception of pain depends upon the development of the encephalic masses; and, consequently, that as this part of the nervous system becomes more perfect, the power of feeling painful impressions increases in the same ratio; or, in other words, that inasmuch as the strength, activity, and intelligence of an animal, by which it can escape from pain, depends upon the perfection of the brain, so does the perception of torture depend upon the condition of the same organ. How far the feeling of pain is acutely developed in the animals we are now considering (articulates) is deducible from everyday observation. The fly seized by the leg will leave its limb behind and alight with apparent unconcern to regale upon the nearest sweets within its reach; the caterpillar enjoys, to all appearance, a tranquil existence while the larvæ of the *ichneumon*, hatched in its body, devour its very viscera; and, in the crustacea, of so little importance is the loss of a leg, that the lobster will throw off its claws if alarmed by the report of a cannon; and, again, should the claw of a lobster be accidentally damaged by accidents, to which creatures incased in such brittle armour must be perpetually exposed, the animal at once breaks off the injured member at a particular part, namely, at a point in the second piece from the body; this operation seems to produce no pain.

SPIRITUALISM & MR. J. W. FLETCHER.

[*From a Correspondent.*]

The *Whitehall Review*, of the 13th September last, published an account of a sitting with the well known medium and clairvoyant, Mr. J. W. Fletcher. The *University Magazine* of June last has also an article on the same subject, termed "The Preternatural of the Present Day," and as this subject is now occupying the minds of many scientific men, among whom should be mentioned Mr. William Crookes, F.R.S., who is the author of "Researches in the Phenomena of Spiritualism" (reprinted from *The Quarterly Journal of Science*), and Mr. Alfred Russel Wallace, F.R.G.S., it cannot be out of place to bring it under the notice of the readers of the *Scientific Review*. Perhaps it is almost premature to call Spiritualism an inductive science, but call it what we will the evidences of the phenomena are so astounding and so well supported by the testimony of those whose *bona fides* cannot be questioned, that to pooh-pooh it is vain. It remains to develope the researches already made, and test the evidences embracing the subject. This is now being done by the Psychological Society, and the British National Association of Spiritualists.

Mr. J. W. Fletcher has, from his childhood, been gifted with second sight. This gift is not new, but with this gentleman it has reached, one may say, the most perfect state on record, proofs of which are elucidated in both the papers above mentioned, especially the former. Those who feel interested have only to visit Steinway Hall to witness the phenomena; there Mr. Fletcher gives inspirational addresses every Sunday evening. On these occasions surpassing proofs of spirit identity and of occult knowledge are given, received, and suitably acknowledged. These addresses are neither pedantic nor theological. They are the utterances of spiritual life suffused with a divine light, full of poetry and imagery, in which the soul is touched through the mind. Evolution, and the various speculations about which theologians cavil, are not discussed, but the necessity for the soul's existence after the dissolution of the body, and its state after death are evolved. There is every reason to believe that if Mr. Fletcher could get nothing from the Spirits or Psychic force than simply the moving of objects, he would relinquish their power. His soul soars higher than this; he speaks as a prophet, and believes he has a mission to fulfil.

Mr. Fletcher is a man of gentlemanly bearing, slight in figure, soft voiced, large intellectual eyes, with a well developed handsome head, supported by a neck of singular beauty; a man of culture, in whose presence one immediately feels at home, and a most agreeable companion. He is the guest of London society, and the courted of lords and ladies. Mrs. Fletcher is a most charming lady, who has the gift of clairvoyance, and is also a successful healing medium.

To have a private sitting with Mr. Fletcher is one of real enjoyment. It is not always that the communion is direct with the spirit of the departed. However, whether in this manner, or through his guardian control, the tests and evidences have been so numerous as to convince some of the greatest sceptics. To all who desire to investigate Spiritualism we would recommend an interview with Mr. Fletcher, whose address will be found in the *Spiritualist*.

TECHNICAL EDUCATION.

The newly-formed City and Guilds of London Institute for the advancement of technical education has just issued its programme for examination. It has been decided that the first examination shall be held in May next, and the subjects, range of examinations, and name of examiner in each subject are announced. Full particulars may be had on application to the secretary, City and Guilds of London Institute, Mercers' Hall, E.C. The subjects on which provision is made for examination are in twenty-six groups, as follows: 1. Alkali Manufacture; 2. Blowpipe Analysis (Practical); 3. Brewing; 4. Calico Bleaching, Dyeing, and Printing; 5. Carriage Building; 6. Cloth Manufacture; 7. Cotton Manufacture; 8. Electro-Metallurgy; 9. Gas Manufacture; 10. Glass Manufacture; 11. Goldsmith's and Silversmiths' Work; 12. Iron Manufacture; 13. Lace Manufacture; 14. Oils, Colours, and Varnishes (Manufacture of); 15. Paper Manufacture; 16. Photography; 17. Pottery and Porcelain; 18. Printing; 19. Silk Manufacture; 20. Silk Dyeing; 21. Steel Manufacture; 22. Sugar Manufacture, &c.; 23. Tanning Leather; 24. Telegraphy; 25. Watchmaking; 26. Wool Dyeing. It will be noticed that the trade of boot and shoe making, which so largely affects the happiness of thousands, is not yet included. The omission of plumbing in relation to gas and water fitting, both of which require better knowledge than plumbers at present possess, is perhaps only temporary. Nothing is said about the teaching schemes of the guilds, but from advertisements and notices in the scientific journals it seems that the appointment of a staff of teachers for the central institution is to be made with deliberation, and that no practical steps will be taken in this directions for twelve months. The whole scheme has been under consideration for a long time, and last year the "Livery Companies' Committee" on the subject issued a report containing special reports from Sir W. G. Armstrong, Mr. G. T. C. Bartly, Lieutenant-Colonel Donnelly, R.E., Captain Douglas Galton, C.B., F.R.S., Prof. Huxley, and Mr H. Wood, M.A. These different reports, besides being printed in full, were given in digest, and in the committee's own report the appointment of professors, with assistants, in applied physics, applied chemistry, applied mechanics, and applied art was recommended. It was pointed out that not less than £20,000 a year would be required for carrying out the scheme, and nearly £12,000 was soon guaranteed by different City companies. The present programme, however, has reference only to examinations, which may be conducted in any part of the country where a local committee of the Science and Art Department, or any examination Board connected with the Society of Arts, will superintend the examination. The examination will be in three grades—1, Honours; 2, advanced; 3, elementary. Grade 1 is intended principally for foremen, overlookers, &c.; grade 2, for journeymen; grade 3, for apprentices; but candidates may enter themselves for any grade they choose. Certificates (first and second class) will be awarded in each grade. Candidates who have taken a certificate may be again examined for one of a higher grade or class in another year. Provision is made for grants to teachers on the same principle as the grants to teachers made by the Science and Art Department. Teachers who desire to form classes must have their names registered at the Institute, Mercers' Hall, or their claims for payment will not be entertained. The Society of Arts has already set the example of holding examinations on technical subjects, and last year 13 were passed in alkali manufacture, nine in gas manufacture, 13 in cotton, and 52 in steel manufacture, besides smaller numbers in other subjects. All those passed besides the elementary science and art examination. A large number, 34, in steel manufacture also passed in the technical subjects alone. The experiment of technical examination in local centres is, therefore, not new.

Dr. Andrews has resigned the offices of Vice-President and Professor of Chemistry in Queen's College, Belfast.

Mr. Friedrich Wegmann, of Zurich, has recently patented in Germany the "application in roller mills of rollers whose coating shall consist of a homogeneous mass of porcelain, china, or glass, containing as much silica as shall be requisite to obtain the necessary degree of hardness for the process of grinding."

Correspondence.

IMPROVEMENT OF SOUND.

TO THE EDITOR OF THE SCIENTIFIC AND LITERARY REVIEW.

For more than two thousand years it has been the study of man to enable sound to travel in such a manner as to be heard distinctly at least for a short distance; but although science has made most wonderful discoveries, up to this time no improvement in sound itself has been accomplished.

The architect, with all his knowledge, works entirely in the dark, as he can never make sure of the kind of sound his building will produce when completed, nay, it is well known that frequently a place which is excellent for sound when quite full of people becomes indifferent in this respect when only partially filled, or *vice versa*. The cause of this is that when the sound-wave strikes against a hard substance it returns and combines with the original sound, and thus increases its volume; but as the return of this sound-wave must depend on the shorter or longer distance it has to travel it will be easily understood that the latter must destroy the clearness of the former, and in some instances make it unintelligible, and this defect is to be found more or less in all large buildings.

Means may be produced to remedy this, but then the sound will appear to be dull as the resonance is taken away, and a speaker or singer can then only be distinctly heard by those nearest to them. It is therefore of the highest importance to increase the sound at its source, and this it has been my fortune to accomplish.

The apparatus not only increases the volume of sound, but gives a richness to it which has never been heard before, and it will be in the power of a director to diminish the sound for a large orchestra, or use its full power for a soft solo, which will make singing and speaking much easier.

The apparatus is easily attached to pianos, organs, &c., and produces a surprising effect, of which you may judge yourself by seeing and hearing it at the address below.—Your obedient servant,

A. C. ENGERT.

75, City-road, E.C.,
15th Sept., 1879.

RECENT AMERICAN AND FOREIGN PATENTS.

AN improved fastening for shoes, &c., has been patented by Mr. John Howenstine, of Fort Wayne, Ind. It consists of a case secured to the flap, in which is pivoted a catch, held in position by a spring. A tongue is fastened to the other side of the opening, which is adapted to enter the case and to be engaged by the catch. The catch is made to release the tongue by pressing the projecting end with the finger.

Mr. Thomas B. Mosher, of Portland, Maine, has invented an improved ruler, which consists of a narrow sirip of suitable material, made flat on its under surface to prevent rolling, provided with a sharp edge to serve as a paper cutter. It has a hollow cylindrical back piece running its whole length on its upper surface, so combined with it as to form a step along the line of junction. This step is sufficient to prevent ink from soiling or blotting the paper. The back piece is made hollow throughout for holding pencil or pen handle, or other articles, and in each end there is a plug, one forming the handle of an ink eraser, the other forming the handle of a piece of erasive rubber.

An improved process for removing the germ and fuzzy or woody fibres found upon the ends of wheat and other similar grains before reducing the grain to flour has been patented by Mr. Samuel Potts, of Minneapolis, Minn. The process consists in separating the grain kernels into grades of uniform length, and treating the grades in a continuous operation in separate mills, having each a stationary roughened surface and an opposing revolving roughened surface, these surfaces being rigidly adjusted with respect to each other at a distance apart which is invariable, and greater than the lateral axis of the grain kernels, and less than their longitudinal axis.

An improved life preserving suit, patented by Mr. Frank Vaughan, of Elizabeth City, N.C., has a lower section made in the form of rubber pants, distended and protected by rigid frames and rings, and having a sectional annular float at the waist. It is worn in connection with a rubber shirt having a strap and draw cords to connect it with a flange on the float.

Mr. Anson L. Sonn, of Toledo, Ohio, has invented a novel brush, which is an improvement in the class of hair and other bristle brushes having sheet metal back or casing. It consists in constructing the case or frame of the brush of two metal parts, one being let into or inclosed by the overlapping edges of the other, and united to form a water-tight joint.

A horseshoe, provided with a spring attached to the under side of the toe, and carried back in a median line to the heel, and then brought up in an enlarged form on a double or fold to support the frog of a horse's foot, has been patented by Mr. George Bacon, of White, Mich.

A lamp stand, which can be readily attached to a table, shelf, sewing machine, &c., and will securely hold the lamp placed in it, has been patented by Mr. Joseph Robinson, Sr., of Birmingham, Conn. A clamp grasps the edge of the sewing machine, table, or shelf, and is firmly secured by means of a screw. The lamp sets in the ring with its handle between two uprights; a slide, moved down upon the lamp handle, holds the lamp in place.

An improved barbed fence wire has been patented by Mr. John A. Duncan, of Kansas City, Mo. It consists in providing the main wire or wires with a loop or loops, and passing the wire barbs through the loops and twisting them together and around the wires so that they will be at right angles to each other and held immovable in their places.

An improvement on what is known as the "slow" or bark tanning process has been patented by Mr. George King, of Washington, D.C. Its chief feature consists in alternately subjecting the skins or hides to the action of fresh tanning liquor, then raising them out of it and allowing the liquor to drip or drain off, and, lastly, conducting that portion of the drained liquor which was last in contact with the hides back into the leach to be again passed through the bark, and thus strengthened by taking up an additional quantity of the astringent principle or tanning agent. The apparatus consists of a rotating drum, in whose several compartments the hides are placed, and into which the tanning liquor is constantly fed, and from which it is being constantly withdrawn when its strength has become partly exhausted.

An improvement in the class of wooden axle-skeins provided with a tapering extension for receiving the ends of the axle, has been patented by Mr. Philip Neder, of Stockton, Utah Ter. The improvement consists in hooks, by which the skein is secured to the axle, so as to prevent its endwise movement thereon.

Mr. Joseph V. Morton, of Winchester, Ky., has patented a door fastener that is adjustable to doors of different thicknesses. The invention consists of two handles pivoted to a common connection that extends through the door and connected at the top with a wedge piece that operates the latch. The handle on one side of the door is pushed to open the door; the handle on the other side is pulled.

The combination, with wooden strips on bottom and ssdes of a basket, of metallic strips running under the bottom, up the sides of basket to rim, and overlaid upon the wooden strips, and a horizontal strip running around the body of the basket next to the bottom, has been patented by Mr. Elmer D. Ballou, of Becket, Mass.

Mr. James Hoover, of Gratis, Ohio, has invented an improved electric motor, in which a revolving armature wheel is made use of in connection with fixed electro magnets arranged in a circle around the armature wheel. The construction is such that by the use of one battery the full power of the magnet is obtained every time the circuit is closed. One magnet only being in circuit at once there is only the resistance of that one magnet to the current, while the effect is the same as it would be were all the magnets energised at once with the stronger battery which would then be required.

A wood type having a face formed by a veneering of rubber or analogous material, and the body and sides of the letter composed mainly of wood, has been patented by Mr. Peter Gfroerer, of Terre Haute, Ind.

An improved instrument for measuaing the distance of a remote object has been patented by Mr. John Boger, of Powhatan Point, Ohio. The invention is based upon the general principle of the employment of two right angular bars, one of which is provided with a sighting glass, and is directed toward the object, and the other graduated and provided with another sighting instrument, which, when adjusted to a certain position upon the bar and turned to the object, indicates by the angle at such position the distance of the object, the distances which the different angles and positions together indicated being previously determined by careful measurement.

Mr. William Jackson, of Millerstown, Pa., has patented an improvement in air-compressing apparatus for locomotives, which consists in forming the wheels of the locomotive, preferably the driving wheels, with radial air-compressing cylinders and pistons that are operated by eccentric motion of the tire with reference to the main body of the wheel, so that as the locomotive moves forward the pistons act in succession to force air through the hollow axle of the wheel into a compression-chamber, where it is stores for use in driving the locomotive.

An improved swinging gate, that is to be placed across a railroad track to keep cattle and other animals off, has been patented by Messrs. David A. Walker and John R. Smith, of Fort Benton, Montana Territory. It is to be opened by the contact of the pilot or cow-catcher of the locomotive, and will close automatically immediately after the passage of the train.

A lubricator for journals, provided with a roller arranged longitudinally in contact with the journal, inclosed in a top slot of bearing, and connected by a corresponding slot directly with the oil-reservoir, has been patented by Messrs. C. H. Leonard and W. B. Hick, of Wilkesbarre, Pa.

Messrs. Charles Holzner and John Winstandley, of Louisville, Ky., have patented an improvement in coal-hods, which consists in forming the lower edge of the body portion of the hod with an outwardly-flared flange, and fastening the hoop, foot, or base-ring thereto by contracting it upon said flange and riveting the ends of the hoop together in such contracted position upon the flange. It also consists in combining with the flanged body portion and base-ring a wooden bottom having a metal lining and a tapering or bevelled edge, which bottom is forced inside the base-ring up into the lower edge of the hod, and clamps the flange at the bottom of the body portion between its bevelled edge and the base ring to make a compact and secure connection.

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ESTABLISHED 1st MAY, 1862.

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HELD (NOVEMBER TO MAY INCLUSIVE) AT

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The various efforts which have been made, and the numerous influences now at work to injure, if not destroy, Patent Rights; the inefficiency of the many well-intended, but ill-considered, Schemes of Patent Law Reform, which have from time to time been suggested, and the tendency of which has generally been to prejudice the Inventor without advantage to the Public; together with the proceedings so essentially involving the interests of Inventors which have already taken place in Parliament, as to the propriety of abolishing Patent Rights altogether, show the necessity of an immediate and active co-operation on the part of those interested in Inventions and in Patent Property, and that an Association for the Protection and Defence of Patent Rights is urgently needed. This Institute has, therefore, been established for the purpose of uniting and organising the influence of Inventors, Patentees, and others. Its objects are:—

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2nd. To promote improvements in the Patent Laws.
3rd. To facilitate the diffusion of information with reference to Inventions, and other subjects beneficial to Inventors and Patentees.

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This Association was established in the year 1867, for the purpose of simplifying, cheapening, and expediting as far as possible the proceedings attending THE OBTAINING OF PATENTS FOR INVENTIONS and their commercial development

Several leading members of the Inventors' Institute, coming daily in contact with Inventors, whose wants and difficulties were daily pressed on their attention, formed themselves into this Association, entitled "The Inventors' Patentright Association, Limited," in order to supply Inventors with the best and most reliable information and advice—to provide skilled references on questions of science and manufacture—to render legal processes for protecting and maintaining patent rights safe, cheap, and ready—and to aid Inventors in bringing their inventions into practicable and profitable shape. To carry out these views, the following are the

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To obtain Patents for Inventions in this and other countries.
To Register Designs. To Register Trade Marks.
To aid in forming public Companies, and in Publicly introducing Patented Inventions.
To aid in Selling and Licensing Patented Inventions.
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Printed by EDWIN JOHN DAVEY, Boy Court, Ludgate Hill, E.C.; and Published for the Proprietors, at 21, Cockspur Street, Charing Cross; and sold by W. KENT, Paternoster row, and SAMPSON LOW, SON, & MARSTON, English, American and Colonial Booksellers and Publishers Crown Buildings, 188, Fleet Street, London, E.C.

23 DE 79